Job Creation in Spain: Productivity Growth, Labour Market Reforms or both?*

J. Andrés[a], J.E. Boscá[a], R. Doménech[b] and J. Ferri[a]

a University of Valencia, Spain
b Economic Research Department, BBVA, Spain

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Abstract

The benefits implied by changing the growth model are at the heart of the heated political and economic debate in Spain. Increases in productivity and the reallocation of employment towards more innovative sectors is defended as the panacea for most of the ills afflicting the Spanish economy. In this paper we use a DSGE model with price rigidities, and a labour market search frictions a la Mortensen-Pissarides, to assess the effects of the change in the growth model on unemployment. To do that, we assume that the vigorous demand shock that has been mostly responsible for recent economic growth in Spain will be successfully substituted by a productivity shock as the main driver of Spain's economic growth in the future. So we assume that we actually succeed in the so called "change in the growth model". We show that whatever the benefits that this change might bring to the Spanish economy, this actually increases the time span needed to bring the unemployment rate down to the European average. We then analyze the impact of several reforms in the labour market and evaluate their interaction with the new growth model. We conclude that changes in the economic structure do not make labour reforms any less necessary, but rather the opposite if we want to shorten employment recovery significantly.

Keywords: productivity, labour market, general equilibrium.
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1. Introduction

The Spanish economy has enjoyed a prolonged high growth span from 1994 to 2007, characterized by extensive job creation. From the sixties to the early nineties the number of jobs in the Spanish economy has fluctuated around a stagnant level of 13 million that made many people support the idea that the Spanish economy could not be ever able to break this limit. From 1994 to 2007 the labour market has been able of increasing employment from 13.3 to 20.6 million workers. The great moderation period brought to the Spanish economy historically low interest rates and an expansion of credit facilities, that contributed to sustain a vigorous and prolonged path of both private consumption and investment growth. Spain managed also to reduce public debt to unknown levels around 30% and turned endemic public deficits into surpluses that reached 2 percentage points of GDP in 2007. All along this expansionary process the labour force increased considerably due to a sustained process of immigration flows that, nevertheless, was compatible with the unemployment rate converging to average European levels. In this sense, the rate of unemployment fell from around 20% in the mid nineties to a level of 8% in 2007. For the first time since the first big oil price shock, Spanish unemployment was down to the European Union average.

This rapid growth has been far from healthy and all along this period our economy has accentuated some imbalances that explain the differential effect of the recession, as far as the unemployment is concerned. First and foremost while the Spanish economy was growing faster than most of the countries in Europe, productivity growth was almost zero. Also the sector composition of production was heavily biased to relatively low productivity sectors (mainly real estate construction and services), that experienced the bulk of employment creation. Since the beginning of the century the Spanish real state prices increased enormously (multiplying by about 2.5 from 2000 to 2007) contributing heavily to increase the levels of indebtness of many households engaged in the mortgage market and also in consumption credits. The specialisation in goods with low value added per worker, the limits to competition and the pressure of domestic demand, drove prices upwards generating persistent positive inflation differentials that deteriorated competitiveness vis-a-vis our trade partners. In fact, the Spanish economy accumulated an impressive current account deficit that reached 10% of GDP in 2007, and whose quantitative amount was the second biggest in the world (after the US). Finally, although the process of job creation has been very successful over the last fifteen years, the functioning of the Spanish labour market has been far from perfect. Unemployment has never going below the EU average and the market is characterized by a severe degree of duality with highly protected workers and high dismissal costs, along with workers with very low protection and low or nil

dismissal costs. [1]

As a result of these imbalances the Spanish economy has suffered the effects of the world recession far more intensively than most advanced countries. The poor performance of our economy is particularly blatant in the labor market. Since the beginning of the recession the rate of unemployment has more than doubled to reach 18% and is expected to increase further in the coming months. Thus, although the fall in economic activity has been more moderate than in other countries job destruction has been much more intense. Real estate construction stopped suddenly, with an important effect on employment, but also other sectors in the economy (industry and services) destroyed employment at a high pace.

What are the reasons behind this poor performance of the labour market in Spain? Some analysts argue that labour market institutions function reasonably well and that the main cause of the disproportionate job destruction (relative to GDP fall) is the low productivity of many firms, in particular in those in building and tourism related activities. The impressive job creation process from the mid nineties to 2007 was based on low productivity sectors, mainly building and services, employing mostly low skilled workers. As a result the crisis has destroyed firms and employment of low quality, and these are difficult to recover in the near future where it is not foreseeable that the building sector or the service sector becomes again the growth engine of the Spanish economy. Thus, the proponents of this view argue, the reallocation of resources towards industries with higher value added and an intensive use of technology (or the "change in the growth model", as it has been coined) is a sufficient condition to achieve significant and permanent reductions in the unemployment rate.

Many economists view this approach to the causes of unemployment in Spain as inadequate. Major changes in the allocation of resources are complex and lengthy processes. Besides, such a change can hardly be conceived without wise and profound reforms of labour market institutions in an economy that has been characterized by high and persistent unemployment, even in the years of extraordinary employment growth (see Romero-Ávila and Usabiaga, 2007, for a recent study). In a wide study using 21 OECD economies since 1980 Garibaldi and Mauro (2002) find evidence that labour market institutions such as unemployment benefits, trade union coverage, level of taxation, and employment protection influence the rate of growth of employment. These authors also find support that the sector composition of employment plays a minor role.

In this paper, we argue that whereas steps towards a productivity based growth are key for a strategy of high and stable employment, that does not make the need for labour

[1] Since the reform of 1984, job creation has relied mostly on temporary contracts (see Aguirregabiria and Alonso-Borrego, 2009) and the rate of fixed time jobs in Spain is the highest in the OECD.

reforms any less pressing. On the contrary, the end of the low-interest-high-demand years is likely to imply slower job creation. If we manage to find the right incentives to promote investment in high value added sectors to make our economy closer to the European average, the rate of job creation is bound to be far more modest that the one we have witnessed these last fifteen years. We will show that in that scenario the application of suitable reforms in labour contracts, collective bargaining and active and passive labour policies can help to speed up the reduction of the unemployment rate.

Section 2 summarizes some stylized facts about the growth model in Spain. In particular, we provide evidence of how the relationship between production growth and change in unemployment (Okun's law) has changed over time. In section 3 we construct an European average benchmark for a new growth model and perform an accounting exercise to analyze the effects of changing the growth model in Spain. In section 4 we discuss a framework for reforming the labour market in Spain, and use REMS, a dynamic general equilibrium model calibrated for the Spanish economy, to evaluate the benefits of the labour market reform. Finally, section 5 concludes.

2. The Spanish growth model

In this section we compare some of the characteristics of the Spanish production structure with that of other developed countries. In particular, we document medium-run differences in aggregate employment and productivity growth, taking into account the sector composition. We will also uncover the relationship between output growth and unemployment changes (the Okun's law), both in Spain and the European Union.

The Spanish economy has been a reference in employment creation across Europe from the second half of the nineties on, as shown in Figure 1. During the 1994-2007 period, annual rates of growth of employment have been persistently well above that of the United States, Germany, or an aggregate of ten European countries[2]. Annual employment growth in Spain averaged 3.15 percentage points from 1994 to 2007, while this figure was only 0.41%, 0.80% and 1.33% in the cases of Germany, EU-10 and the US, respectively. This has had an impressive effect on the Spanish unemployment rate (see Figure 2) that has gone from almost 20% in 1994 down to average European levels of around 8% in 2007.

These large swings in the Spanish unemployment rate are not a novel feature. During the 1985-1991 boom the unemployment rate fell from 18% to 13%. However, during the ensuing recession this rate jumped to almost 20% in 1994. Thus, what the 1992-94

[2] Countries building the aggregate of ten European countries (EU-10) are: Germany, Belgium, Denmark, France, Austria, Italia, The Netherlands, Norway, Portugal and Sweden. These are the only ten countries belonging to the European Union, for which there are available data (for a sufficient time span) on sectoral production and employment.

Figure 1: *Employment growth*

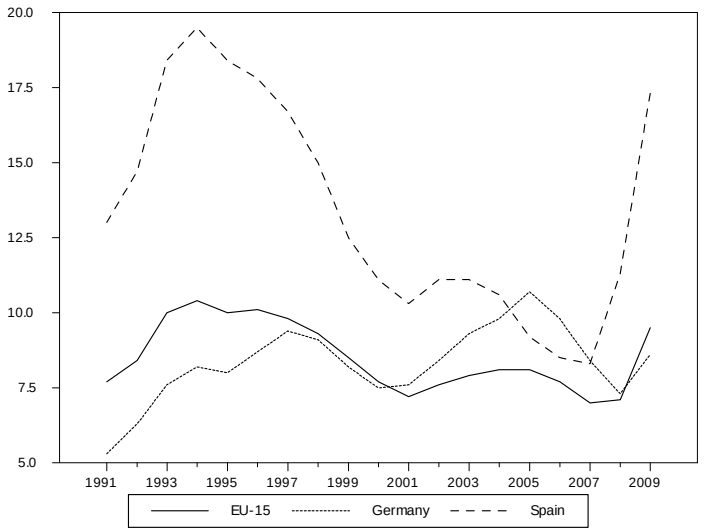

Figure 2: *Unemployment rate*

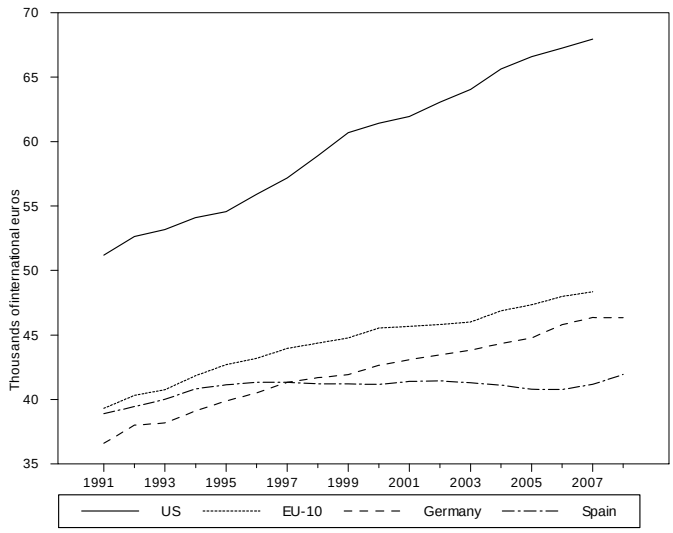

Figure 3: *Productivity evolution.*

and the 2008-09 episodes teach us is that employment and unemployment rates have been much more volatile in Spain than in other developed countries. Underneath these quantitative features, there is a much more worrisome picture that emerges as regards the quality, in terms of wages and productivity, of the jobs created in booms. Figures 3 and 4 show how the years of high employment creation have been characterized by productivity stagnation. Productivity growth averaged an annual rate of 0.2% in Spain between 1994 and 2007 against 1.4% in Germany (1.8 and 1.2 points the US and EU-10, respectively). This has generated a sharp divergence with the rest of the EU-10. While productivity (in purchasing power standards) was almost identical in 1991 in Spain and the EU-10, in 2007 it is 15% lower in Spain (see Figure 3).

Several authors have documented the negative (positive) trade-off between employment (unemployment) and productivity growth that has occurred in Western Europe since the seventies (see Rezai and Semmler, 2007, Dew-Becker and Gordon, 2008, and Enflo, 2009, for some recent references). One simple explanation for this negative relationship between productivity and employment can be attributed to positive shocks in labour force participation. However, as stated by Gordon (1995), this is a short run implication, since there are other shocks that may drive both employment and productivity upwards. Thus, in the medium-run capital accumulation may increase productivity and eliminate the negative trade-off. In fact, Ball and Mankiw (2002) uncover a positive correlation between productivity growth and structural employment in the United States. Thus, understanding the factors that generate the trade-off to persist in Spain overtime is crucial in order

Figure 4: *Growth rate of productivity.*

to assess the effectiveness of alternative policies designed to reduce unemployment (or increase employment) in the economy.[3] The nexus of productivity and unemployment (or employment) can be established through the lenses of Okun's law. Given that the growth rate of output is the sum of productivity growth and employment growth, we can start from an aggregate production function to obtain the Okun's relationship[4] and analyze the possible sources of variations in the trade-off between unemployment changes and production growth. More specifically, let us consider the following production function with disembodied technology, in per capita terms:

$$Y = A\left(\frac{cK}{L}\right)^{1-\alpha}\left(\frac{N}{L}H\right)^{\alpha}L$$

where Y stands for production , K for the capital stock, c for the capital capacity utilization rate, N for employed workers, H for hours per worker, A for total factor productivity and L for total population in the economy. This expression can be written in terms of the per capita capital stock, k, the labour force, S, and the level of unemployment, U, as

$$Y = A\left(ck\right)^{1-\alpha}\left(\frac{S-U}{L}H\right)^{\alpha}L$$

[3] Or, in Gordon's words, "*we should be able to identify the policies that shift the unemployment-productivity tradeoff in the right direction*".

[4] See Courtney (1985) for a similar approach.

or,

$$Y = A\left(ck\right)^{1-\alpha}\left(\frac{S}{L}-\frac{U}{L}\right)^{\alpha}H^{\alpha}L = A\left(ck\right)^{1-\alpha}\left(\frac{S}{L}-\frac{U}{S}\frac{S}{L}\right)^{\alpha}H^{\alpha}L = A\left(ck\right)^{1-\alpha}\left(s\left(1-u\right)\right)^{\alpha}H^{\alpha}L$$

where s is the participation rate and u the unemployment rate. Taking logs and deriving with respect to time we can obtain the equivalent expression in terms of the rate of growth of the variables[5],

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A}+\frac{\dot{L}}{L}+\left(1-\alpha\right)\left(\frac{\dot{k}}{k}+\frac{\dot{c}}{c}\right)+\alpha\frac{\dot{s}}{s}+\alpha\frac{\dot{H}}{H}-\frac{\alpha}{e}\dot{u}$$

or,

$$\dot{u} = \frac{e}{\alpha}\left[\frac{\dot{A}}{A}+\frac{\dot{L}}{L}+\left(1-\alpha\right)\left(\frac{\dot{k}}{k}+\frac{\dot{c}}{c}\right)+\alpha\frac{\dot{s}}{s}+\alpha\frac{\dot{H}}{H}\right]-\frac{e}{\alpha}\frac{\dot{Y}}{Y} \tag{1}$$

where e stands for the employment rate and $\dot{u}$ is the change in the unemployment rate.

Let us now assume that total factor productivity, population (through higher immigration), capital utilization, labour force participation and average working hours are procyclical. Then, we may establish the following structural linear relationships

$$\frac{\dot{A}}{A} = \beta_1\frac{\dot{Y}}{Y}, \frac{\dot{L}}{L} = \beta_2\frac{\dot{Y}}{Y}, \frac{\dot{c}}{c} = \beta_3\frac{\dot{Y}}{Y}, \frac{\dot{s}}{s} = \theta_4+\beta_4\frac{\dot{Y}}{Y}, \frac{\dot{H}}{H} = \theta_5+\beta_5\frac{\dot{Y}}{Y}.$$

where all $\beta's$ are positive and the $\theta's$ represent shocks that stand for capturing different institutional and economic factors that may influence some labor market variables irrespective of the business cycle. For example, a positive (negative) shock to θ_5 causes that the relationship between hours and output becomes less (more) than proportional. Also θ_4 can be seen as a shock to labour supply.

Plugging these relationships into equation (1) allows us to obtain the following reduced form for the Okun's law

$$\dot{u} = \delta\left(t\right)-\beta\left(t\right)\frac{\dot{Y}}{Y} \tag{2}$$

[5] Okun (1962) suggested two alternative approaches for estimating the tradeoff between unemploymnet and production: a "first difference" and a "gap" model (output as deviations from the potential level). Here we follow Knoester (1986), Lee (2000) and Huang and Lin (2008) in using the first difference approximation.

where

$$\delta(t) = \frac{e(t)}{\alpha}\left((1-\alpha)\frac{\dot{k}}{k}(t) + \theta_4(t) + \theta_5(t)\right)$$

and

$$\beta(t) = \frac{e(t)}{\alpha}\begin{pmatrix} 1-\beta_1(t)-\beta_2(t)-(1-\alpha)\beta_3(t) \\ -\alpha\beta_4(t)-\alpha\beta_5(t) \end{pmatrix}$$

We have included time dependence in the parameters to account for the fact that unemployment - growth link is time-varying (see Huang and Lin, 2008, for econometric evidence).

Notice that any shock affecting positively (negatively) the parameters in the intercept moves the Okun's curve outwards (inwards) implying that a higher (lower) variation in unemployment will be associated with the same rate of growth of output. Accordingly, a negative shock affecting labour force or hours per employee growth will shift the Okun's curve inwards. There is a set of labor market policies and institutional changes that affect hours or labour force and contribute to move down the Okun's curve. For instance, with respect to working hours, any measure that induces a decrease in the market tightness will reduce the implicit cost of hiring, increasing the willingness of firms to substitute employment for hours, thus pulling θ_5 down. Even a more direct effect is due when a decrease in the cost of posting vacancies occurs or when there is an improvement of efficiency in the way vacancies and unemployed workers match each other. Also a reduction in labour hoarding produces working hours per employee to shrink, acting as a mechanism that reduces unemployment for a given growth of output. Finally, any measure aimed to reducing the marginal cost of firms also tends to reduce working hours per employee and moves the Okun's curve in the right direction. Regarding θ_4, any shock in the activity rate will affect the position of the Okun's curve. For instance, the incorporation of immigrants to the labour force, and other specific population groups, like women and youngsters, may be processes behind shifts in the Okun's law. Also a reduction in any of the betas, which will indicate a lower degree of covariance between the variable and output, makes the slope of the Okun's curve steeper.

Thus, we have seen that changes in technology, including skill biased technological change, government regulations in the labour market, immigration policies, taxes, sector distribution, labour market tightness, input prices, etc, would contribute to modify the Okun's schedule over time, by changing the structural relations behind the reduced form parameters in equation (2).

To illustrate these effects Figure 5 represents three different Okun's curves, i.e. three negative linear relationships between the rates of growth of production and the variations

of the unemployment rate[6]. To simplify the interpretation, we focus only in the region where the growth rate of production is positive. Consider first the continuos line passing through the points A and B. For this economy, when output growth is zero, the unemployment rate is changing at a rate $A = \delta(t)$. On the other hand, $B = \frac{\delta(t)}{\beta(t)}$ is the rate of GDP growth necessary to maintain the unemployment rate constant over time. Obviously, in order to see a reduction in the unemployment rate output should grow at a higher rate than B .

Upward shifts of this schedule can be considered as short run "unfavorable shifts" for unemployment. Conversely, any change moving the Okun's curve downwards is a short run "favorable shift" for unemployment. Therefore the schedule represented in the figure by the dashed line DE is more favorable to employment creation and to unemployment reduction than the initial curve. This means that for a given rate of growth of production, the performance of the labour market is better if the economy is located in this second schedule. Coming back to equation (2), a reduction (increase) in $\delta(t)$ due to less (more) hours worked per employee, to a reduction (increase) in the activity rate, or to an unskilled-biased (skilled-biased) technological change that leads to lower (higher) capital growth will change the Okun schedule to the left (right), improving (worsening) the capability of the economy to reduce the unemployment rate for a given growth rate of production. Notice that this shift in the Okun's curve will be more important the higher the employment rate is.

Think now in the dotted line FE that crosses the initial AB line at point C. The different location of this Okun's curve with respect to the initial one is consequence of two facts: an increase in $\delta(t)$, which produces an unfavorable shift that pushes the schedule to the right, and an increase in the slope captured by the term $\beta(t)$. This change in the slope turns the curve towards the right over the point E. With respect to the initial schedule AB, the new schedule FE has a better (worse) performance of the unemployment rate for any growth rate of production higher (lower) than C. That is, an economy characterized by the curve FE reduces faster the unemployment rate, than an economy represented by the curve AB, when the rate of growth of production is strong, but it destroys more jobs and increases faster the unemployment rate when the rate of growth of production is weak. In other words, the economy with Okun's law FE has a more volatile labour market than the economy characterized by the AB schedule.

Looking at the previous analysis about the Okun's relationship, how can we interpret the high volatility of the Spanish labour market we documented in previous paragraphs? The high volatility may be consequence of structural characteristics of the econ-

[6] Notice that the linear schedule is a simplification, because equation (2) shows that the relationship is in fact no linear.

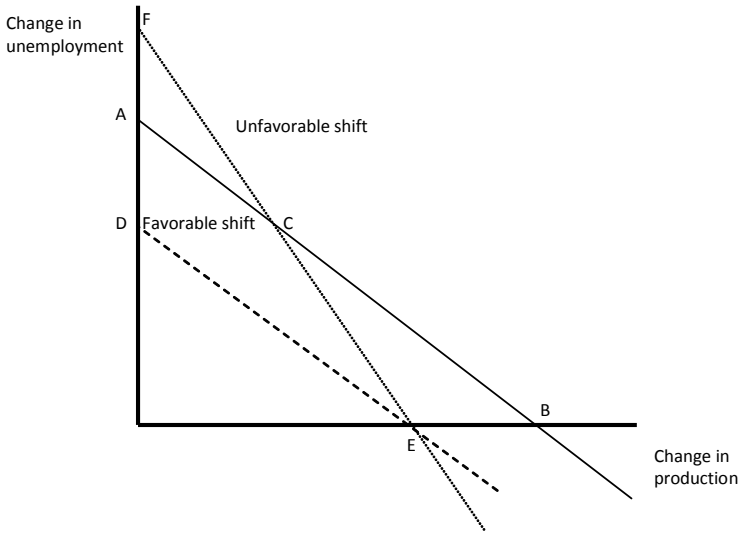

Figure 5: *The Okun's law.*

omy not associated with the business cycle which are, in turn, a combination of different drivers. With respect to parameter $\delta(t)$, possible explanations are related with high investment levels that have caused capital accumulation to take place at higher rates. In fact, Spain has sustained a high investment rate in the years previous to the actual crisis, given that it was able to attract foreign savings quite easily. Also, increases in the labor force as a consequence of massive immigration and raises of woman's participation in the labor market are well documented phenomena. Regarding the slope $\beta(t)$, in addition to the factors mentioned for the intercept, another candidate to explain the high volatility of unemployment in Spain is a weakening of the relationship between total factor productivity and output (β_1) due, for instance, to unskilled-bised technological change as building and tourist activities expanded.

What do observed data tell us about the Okun's curve for Spain? To answer this question we adjust linearly the percentage point variation in the unemployment rate and the rate of growth of output in two different periods. Figure 6 represents the shift in the Okun's curve for Spain between the period 1961-1983 and 1984-2008, along with the Okun's law for the aggregate EU-15 in the first period. Figure 7 displays the same information for Spain, but using the EU-15 Okun's law for the period 1984-2008 as the basis for comparison. We use the year 1984 as a threshold, because Spain undertook that year a deep labour market reform, which allowed a widespread use of fixed-term contracts and reduced significantly dismissal costs of temporary workers.

Some conlusions arise from the study of both figures. First, the Spanish Okun's

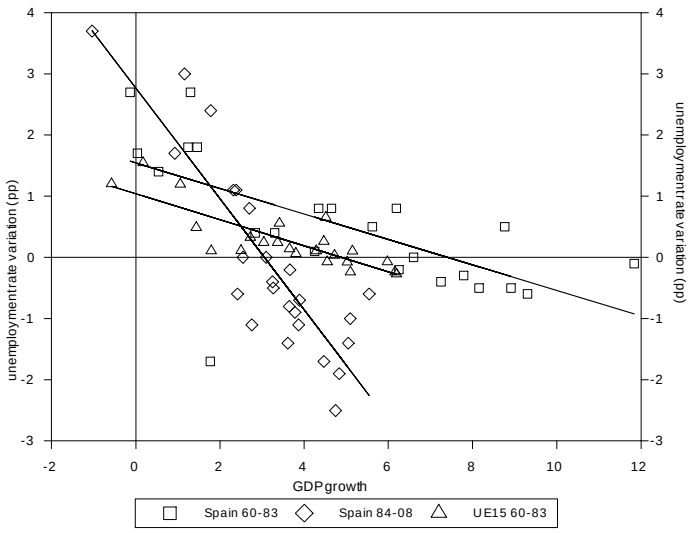

Figure 6: *Okun's law in Spain and first period EU-15*

curve has been located in what we defined previously as an "unfavorable region" with respect to the European curve, both in the first and in the second period. Before 1984 it took much stronger economic growth in Spain than in the rest of European countries in order to reduce the unemployment rate by the same amount. From 1984 onwards things have changed substantially, whereas the EU-15 curve has moved in the right direction over time (a roughly parallel inward shift), the Spanish schedule has experienced a pronounced change in the slope, that has very much increased the volatility of the labour market with respect to the first period, and also with respect to the average EU-15. On the positive side we have that the steeper slope means that the unemployment rate in Spain has decreased much faster than in the EU-15 in years of vigorous GDP growth (3.5%). The opposite happens in a downturn in which a steeper Okun's Law implies faster job destruction. For instance, according to the most recent Okun's curves, a 2 percent growth rate of GDP leaves unemployment rates unchanged in Europe, but increases the unemployment rate by around 1 point in Spain.[7]The analysis so far has been conducted at an aggregate level. However, given that productivity is unevenly distributed across sectors, one may think that the sector composition of production can play a role in explaining employment or unemployment links with production growth. Figures 8 and 9 offer a first glance of the different sector distribution of productivity[8] and employment in Spain and in the EU-10.

[7] This phenomenon is known as jobless growth (see Khemraj et al, 2006 for a recent study)

[8] Levels of productivity are again measured in purchasing power standards (international euros).

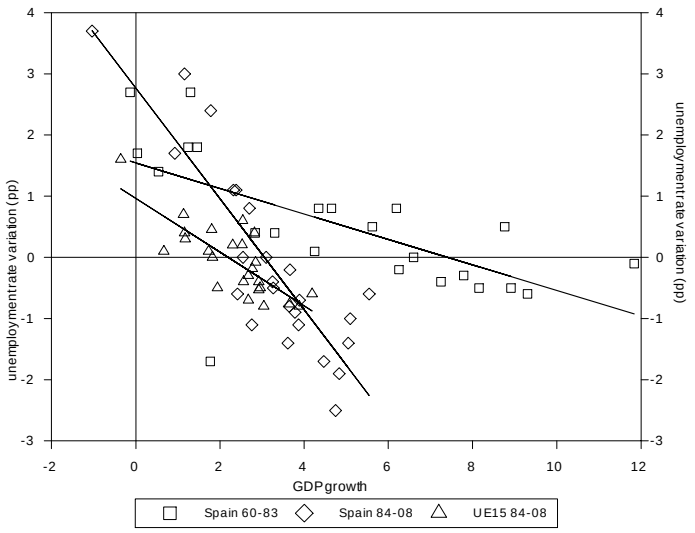

Figure 7: *Okun's law in Spain and second period EU-15*

With the exception of the agricultural sector, were productivity is almost the same in both economies, Spain displays lower labour productivity levels at the end of the sample period (average of the 2003-07 period) in all sectors. Productivity differentials are especially pronounced in the case of the industry. Furthermore, according to Figure 9 Spain is an economy with a high specialization (relative abundance of employment) in sectors of relative low productivity, as building or agriculture[9]. One of the claims of proponents of the change in the growth model in Spain is to create the necessary incentives to shift the sector distribution of production and employment, to make the Spanish economy more similar to those countries with a better performance in terms of unemployment variations. The ongoing debate posses the emphasis in how effective the change of the sector composition of production will be in terms of, first, reducing unemployment rapidly and, second, making it less volatile in the future. There is evidence in the literature that challenges the view that making our economic structure more like the one in the EU average will lead to a positive answer to these two questions. In that vein the work of Groshen and Potter (2003), who study the 2001 recession in the US, suggests that such a change in the growth model does not come without costs. The reallocation of workers and capital among industries creates job losses that are permanent. So, we could expect a long lag before employment rebounds. In addition, we should take into account the effects that

[9] Spain is also specialized in other relatively low productivity activities as commerce and hospitality inside the services sector (not shown in the figure).

a sector shift can induce on the Okun's curve, and its consequences on unemployment in a foreseeable context of weaker aggregate demand. The next two sections of this paper look deeper into these issues.

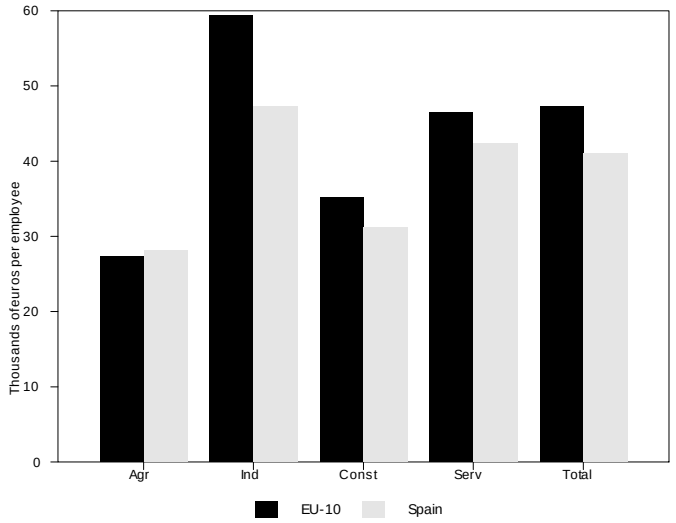

Figure 8: *Productivity across sectors (mean 2003-07)*

3. Growth model and job creation: the example of EU-10

In this section we will perform some simple counterfactual exercises, to evaluate the capacity of the so-called new growth model in creating new employment possibilities. We will take as benchmark of the so called new growth model, the aggregate of European countries we have used in the descriptive analysis performed in previous sections: EU-10. As figures 8 and 9 show, this EU-10 aggregate of countries was 14.9% more productive (in PPSs) than the Spanish economy in 2007; it also displayed higher productivity levels in the Industry, Building and Services sectors. In addition, the EU-10 presents lower weights of employment in low productivity sectors (the weight of the Building sector in employment was 6.6 per cent in EU-10 versus 13.1 per cent in Spain) and a higher weight in high productivity sectors (Services, that includes Financial Institutions, represent the 72.7% of employment in the EU-10 versus 66.8% in Spain, whereas the industry represented 17.3% of total employment in the EU-10 and 15.6% in Spain).

As a first approach to investigate the employment effects of a more productivity based growth model , let us consider three simple counterfactual exercises that represent how the Spanish economic structure could perform if it approached the EU-10 average.

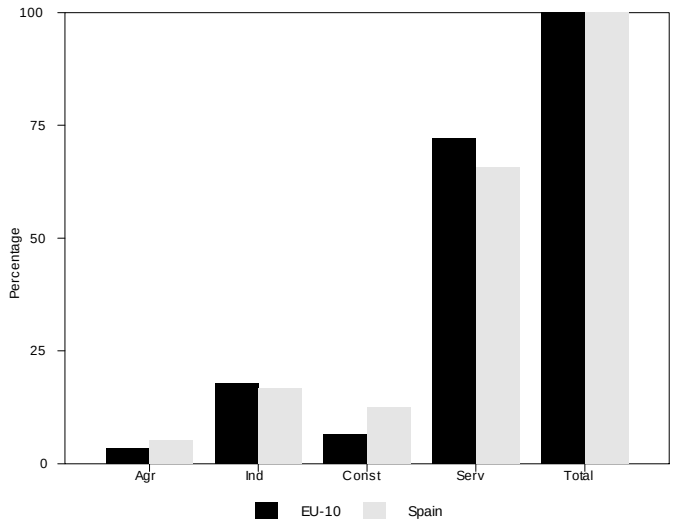

Figure 9: *Distribution of employment across sectors*

1. In the first one we assume that Spain preserves its present sector productivity levels but shifts the sector employment distribution towards converging to the employment weights of the EU-10. This change in the composition would imply a 2.4 percent increase in aggregate labour productivity in Spain.
2. In the second scenario we assume that Spain keeps its current sector employment weights, but that the level of productivity in each sector equals the one in the equivalent sector in EU-10. In this case Spanish labour productivity would increase by 12.5 points).
3. The final scenario combines the previous ones and assumes that Spain converges to both the sector distribution of employment and productivity level in each sector observed in EU-10. This overall effect would close the productivity gap of the Spanish economy increasing productivity by 14.9 points.

Our purpose in doing these counterfactual exercises is to answer the following question: how much employment would have required the Spanish economy to generate observed output with the sector distribution of employment and the productivity levels of the EU-10 aggregate? To this end, we start by decomposing observed total labour productivity of the Spanish economy $\left(\frac{Y_t}{N_t}\right)_S$, into the sum of each sector's observed labour

productivity $\left(\frac{Y_{jt}}{N_{jt}}\right)_S$ weighted by its employment share $\left(\frac{N_{jt}}{N_t}\right)_S$:

$$\overset{\text{output tot}}{(Y_t)_S} = \left(\overset{\text{product sect 1}}{\left(\frac{Y_{1t}}{N_{1t}}\right)_S} \overset{\text{weight empl sect 1}}{\left(\frac{N_{1t}}{N_t}\right)_S} + ... \overset{\text{product sect j}}{\left(\frac{Y_{jt}}{N_{jt}}\right)_S} \overset{\text{weight empl sect j}}{\left(\frac{N_{jt}}{N_t}\right)_S} \right) \overset{\text{empl tot}}{(N_t)_{S0}} \tag{3}$$

Our first exercise consists in changing $\left(\frac{N_{jt}}{N_t}\right)_S$ by the equivalent ratios for the EU-10 $\left(\frac{N_{jt}}{N_t}\right)_E$:

$$\overset{\text{output tot}}{(Y_t)_S} = \left(\overset{\text{product sect 1}}{\left(\frac{Y_{1t}}{N_{1t}}\right)_S} \overset{\text{weight empl sect 1}}{\left(\frac{N_{1t}}{N_t}\right)_E} + ... \overset{\text{product sect j}}{\left(\frac{Y_{jt}}{N_{jt}}\right)_S} \overset{\text{weight empl sect j}}{\left(\frac{N_{jt}}{N_t}\right)_E} \right) \overset{\text{empl tot}}{(N_t)_{S1}} \tag{4}$$

where $(N_t)_{S1}$ represents the employment required to generate the observed production in the past, had Spain had the same sector productivity but the employment shares of the EU-10.

In the same way, to establish the effects on aggregate employment in exercise *2*, we use the following expression

$$\overset{\text{output tot}}{(Y_t)_S} = \left(\overset{\text{product sect 1}}{\left(\frac{Y_{1t}}{N_{1t}}\right)_E} \overset{\text{weight empl sect 1}}{\left(\frac{N_{1t}}{N_t}\right)_S} + ... \overset{\text{product sect j}}{\left(\frac{Y_{jt}}{N_{jt}}\right)_E} \overset{\text{weight empl sect j}}{\left(\frac{N_{jt}}{N_t}\right)_S} \right) \overset{\text{empl tot}}{(N_t)_{S2}} \tag{5}$$

where we substitute $\left(\frac{Y_{jt}}{N_{jt}}\right)_S$ by the equivalent ratios for the EU-10 $\left(\frac{Y_{jt}}{N_{jt}}\right)_E$. Thus, $(N_t)_{S2}$ stands for the simulated employment in Spain under the second scenario.

Finally, exercise *3* mixes the two previous hypothesis in the following equation

$$\overset{\text{output tot}}{(Y_t)_S} = \left(\overset{\text{product sect 1}}{\left(\frac{Y_{1t}}{N_{1t}}\right)_E} \overset{\text{weight empl sect 1}}{\left(\frac{N_{1t}}{N_t}\right)_E} + ... \overset{\text{product sect j}}{\left(\frac{Y_{jt}}{N_{jt}}\right)_E} \overset{\text{weight empl sect j}}{\left(\frac{N_{jt}}{N_t}\right)_E} \right) \overset{\text{empl tot}}{(N_t)_{S3}} \tag{6}$$

where $(N_t)_{S3}$ represents simulated employment had Spain had the sector distribution of employment and the productivity levels of the EU-10 aggregate.

Figure 10 displays the evolution in thousands of workers of observed employment in Spain (continuous line) and simulated employment under each of the three scenarios. Figure 11, reproduces similar information, but fixing an index 100 for the level of employment in 1991. There are two straightforward messages that emerge from these graphs.

First, the composite or reallocation effect is very small. In fact had Spain had the same sector distribution of employment than the EU-10, but preserving the sector productivity employment growth would have been almost identical to the one we have actually

observed: 148 jobs in 2007 for each 100 jobs existing in 1991 (Figure 11).

The second counterfactual exercise, also displayed in these Figures, shows that a transition towards a sector productivity equivalent to that in the EU-10 would have greatly slowed the rate of job creation, even for the remarkable GDP growth rates of the Spanish economy during the period. More specifically, under this scenario Spain would have ended in 2007 with 18.0 million employments, instead of the actual 20.1 million (in index numbers employment would have raised from 100 to 127). These exercises must be read cautiously since these are mere counterfactual accounting exercises that do not take into account other effects that may have resulted from changes in productivity levels. Still, they give us a broad picture as to the job creation capacity of a more technology intensive based growth. They indicate that a more balanced growth strategy in favour of higher productivity activities, however convenient in terms of stable employment would be, is not likely to result in the kind of fast job creation that the Spanish economy might need to reduce the high unemployment rate.

These counterfactuals are carried out assuming that GDP grows at the rate actually observed in Spain during the last fifteen years. It could legitimately be argued that higher productivity might also result in faster growth over and above the observed rates. In order to account for that we look at the previous exercises from a different perspective. We assume that the drivers of Spain's GDP growth in the last fifteen years are augmented by the impact of higher productivity and ask what is the rate of GDP growth that would have made compatible EU-10 productivity levels and Spain's job creation rate. To answer this, we reverse the endogenous variable in equations (4) to (6) and the answer is an implausibly sustained 3.8% annual rate of GDP growth from 1991 to 2007 (Figure 12).

4. General equilibrium evaluation of job creation with the new growth model

In the previous section we have carried out a partial equilibrium analysis, similar in spirit to the shift-share analysis of Garibaldi and Mauro (2002), to establish the sector contribution to employment growth, taking output growth and other relevant macroeconomic variables as given. In this section, we switch our focus to a general equilibrium analysis to evaluate the effects of a change in the growth model, characterized here for a change in the determinants of economic growth from demand (interest rate) shocks to productivity growth. We use the REMS model (Boscá *et al*, 2009) taking into account endogenous relations among the basic macroeconomic aggregates, including key labour market variables such as wages or hours worked.

In this vein, we initially calibrate REMS to reproduce the following stylized facts observed in the Spanish economic in the period between the first half of the nineties and

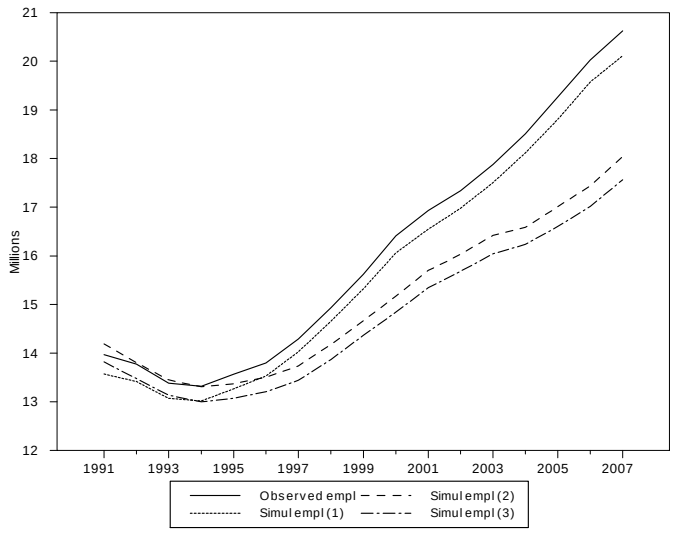

Figure 10: *Simulated employment (levels)*

2007:

1. A yearly GDP growth rate of 3 per cent reduces the unemployment rate by 1 percentage point (this means that it takes 10 years growing at that rate to reduce the unemployment rate by 10 points).
2. Labour productivity is basically stagnant during these years.

Economic growth in this economy is generated by introducing a positive preference shock on consumption. Notice that this is an indirect way of capturing what has occurred in Spain in the last decade, where households experienced a sharp increase in credit facilities, motivated by the historically low interest rates and the easy access of the economy to international indebtness. In technical terms, our approach consists in introducing a shock, η_t in the utility function of households,

$$E_t \sum_{t=0}^{\infty} \beta^t \left[\eta_t \ln \left(c_t^o - h^o c_{t-1}^o \right) + n_t^o \phi_1 \frac{(T - l_{1t})^{1-\eta}}{1-\eta} + (1 - n_t^o) \phi_2 \frac{(T - l_{2t})^{1-\eta}}{1-\eta} + \chi_m \ln \left(m_t^o \right) \right]$$

The alternative scenario (we will call *new growth model* against the previous *old growth model*) consists in making the Spanish economy more productive by means of a positive shift, μ_t, on labour augmenting technological progress that increases labour productivity at a 1 per cent rate during the same period. This shock enters the production

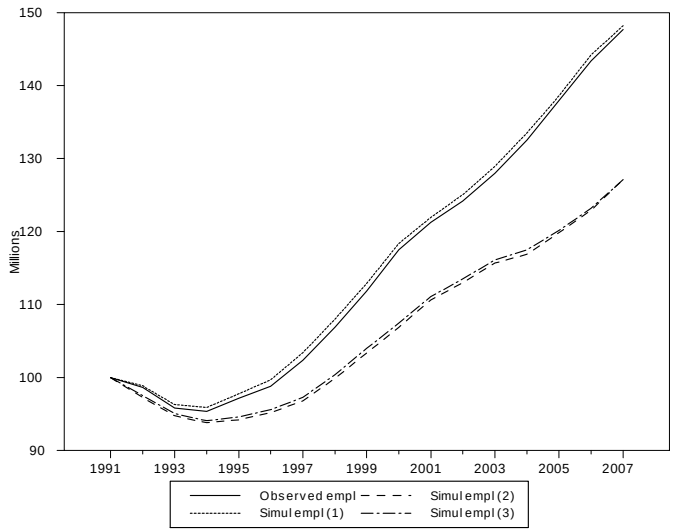

Figure 11: *Simulated employment (index)*

function as follows:

$$y_{it} = z_{it}\left\{\left[ak_{it}^{-\rho} + (1-a)e_{it}^{-\rho}\right]^{-\frac{1}{\rho}}\right\}^{1-\alpha}(\mu_t n_{it} l_{i1t})^{\alpha}\left(k_{it}^{p}\right)^{\zeta}$$

The main objective of this section is to compare the speed with which the economy is capable of reducing the unemployment rate from its initial value (20%) in these two alternative scenarios. The results corresponding to low productivity-demand driven, growth are summarized in row 1 of Table 1. As regards the productivity growth based case we consider that the demand driver looses strength and that the 3% growth rate can be sustained by a favourable technology shock that rises productivity at an annual rate of 1%. The results are depicted in row 2.

High demand and low productivity growth have both concurred to facilitate high employment growth and to reduce the unemployment rate by 1 point per year. These results come along with important changes in the labor force that has been growing at an annual average rate of 2 per cent between 1990 and 2007, mostly driven by immigration (the number of immigrants has multiplied by 4 between 2000 and 2008). We do not intend to capture such a demographic change in our model, and thus,we assume that the first row in Table 1 is a stylized representation of the main medium run trend of the Spanish economy over the last fifteen years, in which productivity has been roughly stagnant. Against this background a switch in the engines of growth towards productivity does not necessarily imply faster job creation. As the results in row 2 show, in this alternative

Figure 12: *Simulated growth of value added*

scenario the time span needed to bring the unemployment rate down to a half of its initial value actually increases to twenty years.[10]

Does this imply that productivity growth based is an undesirable strategy? Far from it, for one thing the years of rapid demand growth could not have lasted for long, and the imbalances accumulated for the Spanish economy, specially in foreign indebtness, would have sooner or latter required slow growth and perhaps a recession. Thus a repetition of the past is not likely but it is not desirable either. Productivity based growth can put a remedy to many of those imbalances but it will not suffice to create jobs at the pace that would be required to absorb current unemployment in few years. The analysis of the observed and counterfactual Okun's law helps to come to terms with this apparent paradox.

What our results suggest is that the change in the growth model makes the slope of the Okun's curve flatter, because it probably tends to increase the structural parameter β_1 and, to a lesser extent, β_3. This flattens the Okun's curve which is good news as far as unemployment stability is concerned, but bad news if we start from a situation of

[10] For copmpleteness we also consider (row 3) the case in which over and above the demand shock responsible for most of the observed GDP 3% growth rate in the past there is an additional annual 1% productivity growth. The combination of these two favourable sources of growth rises the average GDP growth rate to 3.71%. In this scenario it takes about fourteen years to reduce the unemployment rate by 10 percentage points. We consider this counterfactual as highly improbable given that the main stimuli that have driven aggregate demand in the past (low interest rates, easy access to international financial markets, high rate of growth of residential investment) are not expected to operate in the future.

high unemployment and low output growth, as point *F* in figure 5, and we wish that unemployment is reduced quickly. Figure 13, where we present simulations of unemployment changes for different GDP growth rates (Okuns's laws) under the "old" and the "new growth model" assumptions, confirms our suggesttion. The change towards a more productivity oriented growth strategy does indeed rotate the Okun's law around the current GDP growth-unemployment change pair, making eventual reductions in employment slower as the economy recovers. Faster unemployment reduction requires accompanying measures that change the structural unemployment rate to shift this relationship down favouring both stable and rapidly falling unemployment. In terms of figure 5 what we need is not a move from the solid line to the dotted one, but one that shifts the Okun's law down to the dashed line.

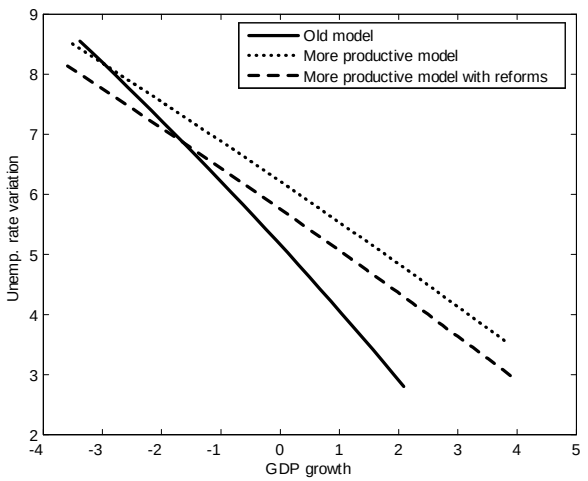

Figure 13: *Simulation of Okun's curves under different scenarios*

4.1 A proposal for reforming the labour market in Spain

Many studies have addressed the incidence of labour market institutions and reforms on unemployment (Blanchard and Wolfers, 2000)[11]. For the Spanish case, Aguirregabiria and Alonso-Borrego (2009) evaluate the last sound labour market reform carried out in Spain in 1984. They conclude that the introduction of temporary contracts in 1984 had important effects on employment and job turnover, but very modest effects on productivity. The objective of the simulations we will present next in this section is to throw light on the foreseeable consequences, in terms of unemployment, of a reform that takes into account

[11] See also Arpaia and Mourre (2005) and Eichhorst et al. (2008), for two recent surveys.

Table 1 −Evaluation of the new growth model

	Labour productivity (growth wrt old model)	GDP growth	Unemployment rate (pp varaiation)	Real wage (growth wrt old model)	Hours per worker (growth wrt old model)	Years to reduce 10 points unemployment rate
Growth model						
Old model (1984-2008)	–	3.00	-1.00	–	–	10.00
New model (scenario 1)	1.07	3.00	-0.49	0.18	-0.47	20.45
New model (scenario 2)	1.00	3.71	-0.72	0	-0.25	13.88

the main problems of the Spanish labour market. We will do it in a scenario were productivity will be growing in accordance with the expected change in the growth model of the economy.

The specific aspects of the reform we will simulate are in the spirit of a recent proposal put forward by a large number of academics in Spain (see FEDEA, 2009). To summarize the main aspects of the proposed reform, we will concentrate around the four basic proposals:

1. A *single* permanent labor contract should be introduced for all new hires, with severance payments increasing with seniority.
2. Protection of the unemployed should be designed in a way that it does not discourage job search. This can be best achieved by raising benefits in the first months of unemployment spells, rather than by increasing the benefit duration.
3. Firm-level agreements, reached by workers and employers, should prevail upon agreements at a higher negotiation level.
4. Reform in the design and implementation of active labor market policies including: routine rigorous evaluation of these policies; participation of appropriately licensed labor intermediation companies and private agencies, in cooperation with public agencies in the provision and management of these policies.

Before proceeding with the presentation of the simulation results, we need to establish a link between the theoretical premises of the proposal and the empirical exogenous variables or parameters of REMS. This is done in Table 2. The different degree of employment protection between temporary and regular workers creates a segmentation in the market: separation rates for temporary workers are much higher than for permanent workers. In fact, Sala and Silva (2009) in a DSGE model with heterogeneous workers, calibrate the job tenure of temporary and permanent workers at 6 months and 10 years, respectively. These numbers imply separation rates of 0.5 and 0.025, respectively. Regarding the first point of the proposal, we will consider that the establishment of a single permanent labor contract might reduce the separation rate, σ. In particular, we will

Table 2 −Correspondence between reforms and rems

Proposal of labour market reforms	Related REMS parameter
A single permanent labor contract	A 5 percent reduction in σ
Raise unemp. benefits at the beginning and reduce duration	A 1 per cent increase in $\overline{l_2}$
Modernize collective bargaining	A 5 per cent reduction of the nash parameter λ^w
Increase the efficiency of active labor market policy	A 10 per cent reduction in the cost of vacancies, κ_v
	A 5 per cent increase in the efficiency of matching, χ_1

simulate a 5 percent reduction in the separation rate[12]. With respect to the second objective we will simulate a 1 per cent increase in job search intensity, that in the REMS model is captured by the parameter $\overline{l_2}$. Regarding the proposal of decentralizing bargaining at the enterprise level, we translate this proposal into a 5 per cent reduction of the Nash bargaining parameter, λ^w, in the efficient wage bargaining equation of the model that tightens the link between wages and firm's productivity. The fourth point of the proposal, that aims at improving the design of active labour market policies, is intended to facilitate a better matching between unemployed workers and vacancies. Better policy implementation is also crucial to enhance human capital endowments of the unemployed through tight monitoring, thus increasing competition in the labour market and decreasing the degree of market tightness to avoid bottlenecks. We translate this proposal to parameters through a 10 per cent reduction in the cost of vacancies, κ_v, and a 5 per cent increase in the efficiency parameter of the matching function, χ_1.

Table 3 summarizes the effects of the different proposals of labour market reform. For the sake of comparison, in the first row we reproduce the results in Table 1 for the bare change of the growth model. Then, assuming that productivity is the main driver of economic growth we repeat the simulation imposing one of the previously mentioned labour market reforms at a time. In the last row we present the results under the assumption of a fully fledged labour market reform that changes all labour markets parameters $(\sigma, \overline{l_2}, \lambda^w, \kappa_v, \chi_1)$ simultaneously.

In all cases the speed of unemployment reduction increases substantially. The precise numbers are of little relevance but by a way of illustration is worth noting that each of these measures tends to reduce the number of years needed to cut the unemployment rate by 10 percentage points by one third. In fact, the joint effect of all these measures summarized in Table 2 is quite impressive, implying a very significant shortening of the this time span to 6.5 years. These changes in labour market regulations not only favour

[12] The exact variation in the parameters of the model is set more or less arbitrarily, as we are mainly interested in the direction of the results. In any case, we will keep the changes in the parameters at modest figures.

faster employment growth but also higher productivity and wages. In particular, the across the board labour reform triggers an annual increase of real wages of 0.4%.

To understand this pattern it is important to bear in mind the complex set of events that changes in the labour market parameters unchains. Total employment in this model is the product of the number of job matchings times the number of working hours of each match. Total matchings are decided by firms through the process of posting vacancies, whereas optimal hours are the result of an efficient bargaining process between employed workers and firms. With stagnant productivity the "old growth model" (row 1) requires a substantial increase in labour input that results in a (moderately) rapid unemployment reduction. The productivity based growth process (row 2) is less labour intensive and thus unemployment is observed to decrease more slowly. Interestingly this is so even though job creation is strengthen by a fall in total hours. Firms and workers find it optimal to increase the number of jobs (matching) and reduce hours per worker (the intensive margin) since the productivity gain sharply reduces the costs of vacancy posting. In the bargaining process it turns out to be optimal for firms to rely on new job openings (now relatively cheaper) than on longer hours; workers also find it optimal to increase the demand for leisure due to the wealth effect generated by the shock.

When productivity growth is accompanied by labour reforms, the latter effect is further reinforced (rows 4-9). All five parameter changes discussed above increase the incentive to post more vacancies that now become less costly (lower κ_v) or carry a higher expected profit (lower σ, λ^w and higher $\overline{l_2}, \chi_1$). This again shifts the balance towards more vacancy posting and job creation, partly compensated by lower hours. For instance, the reduction of 10 points in the unemployment rate, would imply after the 6.5 years needed a fall of approximately 19.3 per cent in the intensive margin. That is, *ex-post*, the reform acts as a *worksharing* mechanism. This worksharing device not only reduces the parameter θ_5 pulling the Okun's curve towards the origin, but probably weakens the pro-cyclicality of hours, reducing the parameter β_5 of the Okun's curve slope, thus making the curve steeper, which is the right movement for reducing unemployment faster, when the unemployment rate is high.

5. Concluding remarks

The Spanish economy has experienced a trade-off between job creation and stable employment over the last 20 years. Since 1997 Spain has championed employment growth in Europe very much as it leads job destruction since 2008. The specialization in low productivity activities and the availability of unskilled workers explain this pattern to a great extent in an economy in which growth has been fuelled by unprecedently low real interest rates. But the inadequate legal framework of labour relations should also

Table 3 −Evaluation of labour market reforms

	Labour productivity (growth wrt old model)	GDP growth	Unemployment rate (pp varaiation)	Real wage (growth wrt old model)	Hours per worker (growth wrt old model)	Years to reduce 10 points unemployment rate
Growth model						
Old model (1984-2008)	–	3.00	-1.00	–	–	10.00
New model (scenario 1)	1.07	3.00	-0.49	0.18	-0.47	20.45
New model (scenario 2)	1.00	3.71	-0.72	0	-0.25	13.88
Labour market reforms						
5% reduction in Nash parameter	1.06	3.00	-0.66	0.16	-0.87	15.06
5% reduction in separation rate	1.11	3.00	-0.68	0.25	-0.95	14.73
5% increase in matching efficiency	1.11	3.00	-0.70	0.27	-1.01	14.27
10% reduction in the cost of vacancies	1.11	3.00	-0.75	0.29	-1.13	13.33
1% increase in search intensity	1.07	3.00	-0.72	0.17	-1.00	13.96
All-embracing reform	1.17	3.00	-1.54	0.40	-2.97	6.50

be blamed for the extraordinary increase in unemployment. Low investment in active labour market policies, employment unfriendly design of passive policies and collective bargaining and, above all, the extraordinarily high rate of temporary workers are some examples of this ill designed normative.

The chances of easy and cheap access to external financing for the foreseeable future are very thin, then Spain must seek to promote alternative incentives to growth, mainly by investing in activities with higher value added and a more intensive use of skilled workers. Politicians and many commentators advocate for a change in the growth model and very much rightly so. What this paper shows is however that whatever the benefits that this change might bring to the Spanish economy, its effectiveness in terms of fast reduction in unemployment is unclear.

An adequate reform that actually deals with the main inadequacies of our labour regulations is called for in order to ease the employment growth-stability trade-off. Our simulations show that such reforms might significantly speed the process of unemployment reduction up, while also fostering productivity and real wage growth in line with what we have seen in Europe. These reforms act as a powerful tool to increase the extensive margin (job creation) while reducing the intensive margin (hours per worker). That is, *ex-post*, the reform acts as a *worksharing* mechanism even though the legal changes we have simulated do not include the direct incentive to part-time contracts.

In more formal terms what we have argued here is that while a change in the growth model is needed to change the slope of the Okun's law, only labour market reforms may help to shift it towards the origin making GDP growth more efficient in terms of unemployment reduction. We conclude that changes in the economic structure do not

make labour reforms any less necessary, but rather the opposite if we want to shorten employment recovery significantly.

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