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Hirings, Separations and Economic Growth. A Different Perspective on Spanish Unemployment*

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Abstract

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1. Introduction

In the applied studies of the labour market, the approach it is usually used consists in the estimation of some labour market equations were the role of the institutional variables is most stressed. These studies are carried out mainly using either structural models[1] or (Structural)Vector Autoregressions (S)VAR[2]. Instead, another way of looking at the evolution of the unemployment rate is through the analysis of the number of employees that enter the pool of unemployed (separations) and the amount of employees that get off from it (hirings). The analysis of the number of hirings and the number of separations may also help to clarify the movements in the unemployment rate.

In other words, the former is the same as saying that the unemployment rate not only depends on factors such as unions, social security benefits (with special importance of unemployment benefits), or monetary and fiscal policies, but also on how effective is the unemployed worker's job searching in the market. To look at the effectiveness of the searching process is to look at the hiring and separation rates and try to explain which are its main determinants.

This is done by Cohen *et al.* (1997) that compare the French and the US labour markets on the basis of the unemployment rates, non-employment rates and labour force per level of education, age and sex. Given that they do not find substantial differences among these two countries, they look at the flows in and out of unemployment. They find that these flows are different accross skills and that, on average, unemployment occurs five times less often in France than in the US, therefore lasting five times longer. In order to explain these differences, they consider the hiring and separation rates as being mainly influenced by the business cycle and a 'capitalisation effect', captured by the growth rate of the economy. Section 2 compares the Spanish labour market with the data Cohen *et al.* provide for France and the US. Taking the aggregate unemployment rates as a measure of the 'average' differential in the unemployment rates, we find that female unemployment is above the average for the groups 16 to 24 years old and 25 to 54 years old, that represent 85% of the labour force. This behaviour applies to all education categories. Thus, female unemployment can be seen as one of the sources of the increase in the Spanish unemployment rates above other countries rates. This is confirmed by a simple exercise were we simulate what would have been the unemployment rate if female participation and unemployment rates had remained in their 1976 levels. Having identified one of the possible sources of the Spanish differentials concerning the unemployment rates, in section 3 we pay attention to the amount of hirings and separations as direct determinants of the level of employment and unemployment. With these series we obtain a representation of the equilibrium unemployment rate and find that its path seems to be highly correlated with the business cycle, as measured by GDP growth. This finding is used in section 4, where there is an attempt to explain how the hiring and separation rates behave related with these two variables. In order to undertake this analysis, we include the interest rates as a discount factor, which allows us to consider the net discounted growth of the economy. Some conclusions are offered in section 5.

[1] See Layard, Nickell and Jackman (1991) for different countries, and xxxxxx, xxxxxx (19xx) for Spain.

[2] See Bean (1992) for the UK, or Galí (1996) and Dolado and Jimeno (1997) for Spain.

2. Some hints about the Spanish Labour market

Spain is the OECD country with the highest unemployment rate (20.5% in 1997). Starting from levels very similar to other European countries at the beginning of the seventies, the Spanish unemployment rate reached 21.5% in 1985, after 10 years of deep recession. During the second half of the eighties, a strong expansionary period permited employment to recover in such a way that the unemployment rate attained a level of 16.1% in 1990. Then, another recession drove unemployment up to 23.9% in 1994, and since then, it has been reduced, reaching today's 20.5%.

As in France, 1990 coincides with a business cycle peak in Spain (1989 for the US). A cross-section comparison of these three countries can be done on the grounds of the tables below and tables provided by Cohen *et al.* Table 1 shows the Spanish unemployment rates in 1990 by age, level of education[3] and sex[4].

[3] Education groups have been made using the following criteria: *very high* education corresponds to people with pre-superior and superior studies (all degrees of university are included in this category), *high* education corresponds to people with medium studies (here we consider people with degrees in FP1, FP2, and BUP), *medium* education includes people with primary education (having the 'Graduado Escolar' degree), and the *low* education group includes people with no studies.

[4] Data used in tables 1 and 2, and table A1 in the Annex come from the EPA (Labour Force Survey).

Table 1
Unemployment Rates.1990.

Age	*Education*	*Males*	*Females*	*Total*
All	Very High	7.38	17.16	11.82
	High	13.60	29.77	19.86
	Medium	10.45	21.15	19.57
	Low	15.40	16.14	15.64
	Total	11.90	23.83	16.11
16 to 24 years old	Very High	40.28	46.55	44.93
	High	23.96	37.85	30.27
	Medium	29.24	39.92	33.04
	Low	34.67	46.77	38.52
	Subtotal	25.79	39.98	31.68
25 to 54 years old	Very High	6.22	13.33	9.42
	High	8.65	23.84	14.04
	Medium	9.10	21.00	12.62
	Low	15.88	20.53	17.42
	Subtotal	9.25	20.55	13.13
More than 55 years old	Very High	2.34	1.45	2.11
	High	4.96	9.64	5.88
	Medium	6.70	6.51	6.66
	Low	12.96	6.52	10.82
	Subtotal	7.91	6.34	7.50

The first thing to point out are the aggregate unemployment rates for the three countries under consideration. French rate was 10,2%, twice the US one -5.5%-, whereas the Spanish one was three times higher -16.5%-. One of the conclusions obtained by Cohen *et al.* is the similarity of the rates of the core group 25-49 years old, between France and the US. This group represents 70% of the labour force in France and 64.7% in the US. Even if the female unemployment rates are higher in France, when looking at the non-employment rates, which includes people out of the labour force and unemployed, the rates turn out to be very similar. The difference between France and the US is in the group 16 to 24 years old (10.9% and 17.9% of the labour force, respectively) and 50 to 64 years old (18.9% and 17.3% of the labour force, respectively). In these cases, French unemployment is higher than in the US for all levels of education.

For Spain, the group 25-54 years old represents 66.7% of the labour force

(see table A.1 in the annex). Related to the aggregate unemployment rate, male unemployment in this group is lower than in France or the US. The only exception is the unemployment rate for very high levels of education (6.22%), three times higher than the French and the US one. However, this affects only a 7.9% of the labour force in the group 25-54 years old. For the high and medium levels of education, the male unemployment rate is less than the double than in the other two countries, which present very similar levels. Finally, for male low educated workers, the unemployment rate is 15.88%, just one and a half times above France and the US (10.8% both of them). In summary, male unemployment rates are proportionately lower than in France and the US compared with their aggregate unemployment rates.

Female rates present bigger differences, with unemployment rates that are well above the French and the US ones. For very high and high levels of education, female unemployment rates are 13.33% and 23.84%, three times the french ones (4.6% and 6.8%) and six times higher than the US ones (2.2% and 4.1%). As before, for lower levels of education there is less difference: for the medium group the Spanish unemployment rate is 21%, compared with 10.9% in France and 4.6% in the US. For the low group these rates are 20.53% in Spain, 16.7% in France and 10.4% in the US. Therefore, except for the last group, female unemployment rates are bigger in proportion than the aggregate ones.

In order to be more precise, in table 2 we provide the Spanish non-employment rates in 1990.

Table 2
Non-employment Rates.1990.

Age	*Education*	*Males*	*Females*	*Total*
All	Very High	27,93	41,76	34,56
	High	37,90	64,44	50,45
	Medium	13,75	78,81	58,58
	Low	64,89	88,68	79,27
	Total	41,33	74,47	58,62
25 to 54 years old	Very High	13.04	27.91	20.12
	High	11.31	53.94	31.33
	Medium	13.42	71.03	43.46
	Low	30.11	75.69	56.28
	Subtotal	14.49	62.00	38.57

When considering the results in table 2, it becomes clear that the main dif-

ference among the three countries in the core group come from the female side. France and the US present similar values (around 18% for the very high education group, 24% for the high one, 29% for the medium one, and 50% for the low one). For Spain all these values are much higher (28%, 54%, 71% and 76% respectively). This reflects the low female participation rates, together with very high unemployment rates for women in the Spanish labour market.

Other differences between Spanish and French and US unemployment come from the 16 to 24 years old group. This group was 20% of the labour force in Spain in 1990, compared with 11% in France and 18% in the US. 75% of this people were in the high education group, so we have to focus in this category to find the key differences with respect to the other two countries. Male unemployment in the high education group was 24%, not that high with respect to France (15.7%), and three times higher with respect to the US (6.6%). Therefore, compared with the aggregate unemployment rates, male unemployment is not that high, especially related to France (recall that the main differences between the French and the US unemployment are in this group and the group 50 to 64 years old). When looking at female unemployment, differences become larger. In Spain the rate is 38%, whereas in France is 16% and in the US is 5.6%. Therefore, we find again the main differences arising from the female unemployment rates.

Finally, the last group, more than 55 years old, represents 13.3% of the labour force, below the French 18.9% or the US 17.3%. Here, the male unemployment rates are surprinsingly similar to the French ones. For the very high education group the rates are, respectively, 2.3% and 4%, for the high education group 5% and 5.6%, for the medium education group 6.7% and 6.1% and for the low education group 13% and 11%. Of course, all of them clearly above the US ones, that are roughly half of these values. Concerning female unemployment rates, for the first time we find values below the french ones for three levels of education (except the high one). However, it is in this category of age where female presence is the lowest, with only a share of 26%.

In summary, we find that female unemployment is the main factor that helps to explain the differential in the Spanish unemployment rates with respect to France and the US. The main explanation for this is the rise in female participation rates in the labour market. In 1976, 34% of women in their working-age were considered in the labour force, one of the lowest rate in Europe. In 1997, this value was still low compared with European standards, but it had risen by 16 points reaching 48%.

The following exercise will help us to confirm the key role of the increase in female participation rates in the rise of unemployment in Spain. The unemployment rate (u_t) can be expressed as the male labour force share (L_t^m) on total labour force (L_t) times the male unemployment rate (u_t^m) plus the female labour

force share (L_t^f) on total labour force times the female unemployment rate (u_t^f),

$$u_t = \frac{L_t^m}{L_t} u_t^m + \frac{L_t^f}{L_t} u_t^f \tag{2.1}$$

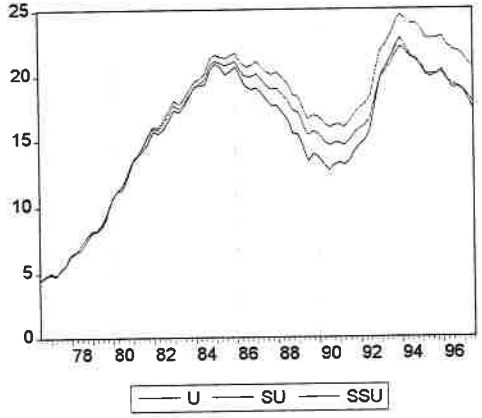
Let's assume that the rate of female unemployment on male unemployment ($\frac{u_{76}^f}{u_{76}^m}$) had remained constant at its 1976 value. Now we define $\hat{u}_t^f$ as,

$$\hat{u}_t^f = \frac{u_{76}^f}{u_{76}^m} u_t^f \tag{2.2}$$

and introduce it in (2.1). The simulated unemployment rate (su) is shown in figure (2.1).

In addition, assume now that the share of female labour force on total labour force ($\frac{L_{76}^f}{L_{76}}$) had remained constant at its 1976 value. Substituting this value by $\frac{L_t^f}{L_t}$ in (2.1), we obtain a second simulation of the unemployment path (ssu), also represented in figure (2.1).

Figure 2.1: Effects of the Rise in Female Labour Force on the Unemployment Rate



The Spanish unemployment rate in the third quarter of 1997 was 20.55%. If the rate of female unemployment on male unemployment had kept its 1976,

the unemployment rate would have been more tahn three points lower (17.21%). If, instead, female labour force had maintained its share with respect to total labour force, the unemployment rate would have been almost three points lower (17.85%). The global effect of these two elements accounts for more than 5 points of the unemployment rate, that would have reached a value of 15.33%. In oher words, one quarter of the unemployment rate today can be explained by the increase in female labour force and the female unemployment rate.

3. Hirings, Separations and the Steady State of Unemployment

Let's turn now to another kind of exercise and attempt to clarify other possible sources of unemployment in the case of Spain. As already mentioned, instead of estimating a labour demand equation in the context of a structural model or using a VAR to analyse the movements in employment and unemployment, we will try to explain which is the main driving force of hirings and separations. Separations include quits and dismissals, and dismissals can be either individual or collective. Due to the problems in obtaining a homogeneous series of separations that considers all these possibilities and long enough to be used in this exercise, we start from a series of hirings. García-Fontes and Hopenhayn (1996) estimate a series of hirings using data on unemployment durations and changes in employment. Instead, here we use the series of hirings[5] in the *Anuario de Estadísticas Laborales* provided by the INEM[6]. The problem in using this series is that it does not capture perfectly the total amount of hirings in the economy. The advantage, though, is that we take the original series without modifying it and avoiding any other calculation. This guarantees its homogeneity. In addition, García-Fontes and Hopenhayn (page 144) point out that this series is a good indicator of the flows from unemployment to employment.

With the total number of hires (H_t), we calculate the total number of separations (S_t) using the following relationship,

$$\Delta N_t = H_t - S_t \tag{3.1}$$

Using the flows out of unemployment and into unemployment we are able to reply the unemployment rate. As Cohen *et al.*, we define s as the probability for a job of being destroyed ($s_t = \frac{S_t}{U_t}$) and h_t as the probability for a worker to find a job ($h_t = \frac{H_t}{N_t}$). How unemployment moves through time can be expressed as follows,

[5] Colocaciones totales.

[6] National Institute of Employment.

$$\begin{aligned} \frac{\delta u}{\delta t} &= s_t(1-u_t) - h_t u_t \\ &= s_t - (s_t + h_t)u_t \end{aligned} \tag{3.2}$$

In the steady state, the unemployment rate stabilizes at a constant value ($\frac{\delta u}{\delta t} = 0$), so that we can obtain the equilibrium rate of unemployment (u^*) as,

$$u^* = \frac{s_t}{(s_t + h_t)} \tag{3.3}$$

This is the rate at which the unemployment rate converges. However, before using (3.3) to calculate the equilibrium rate of unemployment, we subtract the business cycle effect from the hiring and the separation rate. This is done by regressing h_t and s_t on capacity utilization as defined by the OECD, and subtracting its effect. These regressions provide the following results:

Table 3

						R^2
$[I]$	h_t	=	4.33	-	$0.025cu_t$	0.03
			(3.20)		(-1.45)	
$[X]$	s_t	=	8.30	-	$0.096cu_t$	0.26
			(5.64)		(-5.08)	

Note: t-statistic in parentheses.

The effect of capacity utilization is not significant alone in explaining the hiring rate, but is strongly significant, and with the expected negative sign, in explaining the separation rate. The R^2 values confirm that the hiring rate is not affected by the business cycle itself as captured by capacity utilization.Therefore, we use,

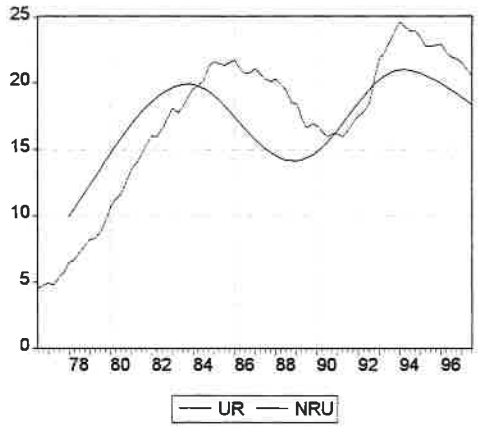
$$u^* = \frac{\hat{s}_t}{(\hat{s}_t + h_t)} \text{ where } \hat{s}_t = s_t - 0.096cu_t \tag{3.4}$$

to calculate the equilibrium rate of unemployment. Figure (3.1) shows the unemployment rate, UR, together with the equilibrium rate of unemployment, NRU.

The main conclusion arising from figure (3.1) is the striking coincidence of the steady state unemployment rate with the changes in the business cycle. We can identify four stages.

- During the second half of the seventies, Spain experiences a strong recession that lasts until 1985. The steady state unemployment rate during this period is above the unemployment rate, which indicates that job creation

Figure 3.1: The Steady State Unemployment Rate



is below what the economy requires. The amount of hirings is low, and unemployment increases. As a result, the ratio of hirings on unemployment takes value 8.8% in the first term of 1978 and 4.8% at the end of 1983, and the probability of getting off from unemployment, therefore, is reduced by 45% in this period (50% following García-Fontes and Hopenhayn (1996)). These authors argue that the low level of hirings in this period is consistent with the increase in the duration of unemployment. At the same time, the amount of separations also increases. The reason why the separation rate does not show significant changes in its path during this period, are the important losses in the number of employees at the same time. This phenomenon is due to massive dismissals from firms that try to change their structure and survive to the crisis and also workers that find themselves as unemployed because of their firm's bankrupcy. This situation occurs in the context of an industrial rationalisation. All this process is also related to a very regulated labour market. The first labour market reform takes place in 1984. The flexibility enhancing measures adopted in that year can be one of the reasons why the steady state unemployment rate takes values below the actual unemployment rate ones before the start of the expansionary business cycle. This is coherent the stress that García-Fontes and Hopenhayn place

in the 1984 labour market reform and its effects on the following expansion.

- The second period starts in 1984 and lasts until the third quarter of 1990, which means that there is an almost exact coincidence with the end of the expansionary cycle occurred during the second half of the eighties. During these years, as a consequence of the reform in the labour market, temporary employment grows very fast, thus pushing upwards the amount of hirings. As stated, García-Fontes and Hopenhayn atribute an important influence of this effect in the reduction of unemployment, however, following Bentolila and Dolado (1994) it does not appear that clear[7]. It is true that unemployment is reduced, and that this contributes to the rise in the hiring rate[8]. However, it is important to indicate that the hiring rate growth is also limited by the slow reduction in unemployment. Despite almost two milion jobs are created between 1986 and 1990, unemployment is only reduced by half a milion. This is probably one of the reasons why the steady state unemployment rate takes values below the actual ones. In other words, given the dramatic increase in job creation, the unemployment rate should have tended towards lower rates of unemployment. In section 2 we have argued that the main reason for the slow reduction in unemployment during these years has to be found in the increase in female participation rates in the labour market.

- The third period that can be distinguished in figure (3.1) leads us to 1993. Here we find again a recession, with a sharp increase in the unemployment rate. The growth rate of hirings slows down, thus creating a strong reduction in the hiring rate as measured on unemployment and also when measured on employment, although it is less pronounced in the later case. On the other hand, the separation rate shows important increases 1990 onwards. It is the combination of the two what pushes the unemployment rate to levels above those of 1984. Using data on Social Security registrations, García-Fontes and Hopenhayn show additional evidence on the reduction of hirings as an important factor in explaining the increase in the unemployment rate during these years.

[7] "This suggests that temporary jobs have led to increased employment opportunities for the unemployed. Nevertheless, in countries like Spain, where these contracts have soared, this fact may just reflect that there is a continuous turnover among temporary workers, who go from employment to unemployment and back again. This turnover increase may be beneficial in reducing long-term unemployment, but may also reinforce a dual labour market, with undesirable consequences on several fronts, and in particular on wage growth". Bentolila and Dolado, page. 66.

[8] Defined as $\frac{\text{Hirings}}{\text{Unemployment}}$.

- Finally, there is a fourth period that starts in 1993. Again, the change in the steady state unemployment rate with respect to the actual rate anticipates the expansionary cycle that starts in 1994. One of the reasons for this to occur can be found in the INEM reform in 1992, that restricted the acces to unemployment benefits and reduced its quantity. At the same time, the amount of time that unemployed could receive these benefits was shortened[9]. Given that the series we have used are from the INEM, the effect of these measures could be overestimated, but we think there would be consensus in the fact that these measures have had an effect on the effectiveness of the search process of unemployed and therefore also on the hiring rate. If it is true that the conditions under which the unemployment benefits were obtained and received are more strict since 1992, then it is obvious that this has put additional pressure on the unemployed to look more intensively for a job. In addition, this process has been helped by the labour market reform in 1994 that has resolutely affected severance payments. It can be argued[10] that this may have affected the risk of hiring new workers, thus ecouraging firms to hire new workers and strenghthen the reduction in the unemployment rate. However, in the last years, the hiring rates growth, in the context of an expansionay period, have shown to be insufficient to reduce unemployment substantially below the levels that have made the Spanish unemployment rate well known. This fact indicates that there exists persistence mechanisms that prevent the unemployment rate to attain values below 15%. Only very strong expansions, as the one occurred in the second half of the eighties, allow reductions in the unemployment rate strong enough to reach values below the steady state unemployment rate. As figure (3.1) shows, only between 1987 and 1989 the steady state unemployment rate took values below 15%, whereas in the present expansion this rate has not been below 18%.

The former analysis makes evident how important is economic growth and its key role in the explanation of business cycles and the determination of unemployment. The importance of economic growth in the analysis of the flows out of and into unemployment, has been scarcely treated and not many studies can be found that consider this issue. The main one is the Pissarides (1990) Equilibrium Unemployment Theory. Once he has developped his basic model in chapter 1, in chapter two he presents an expanded model that allows to consider the effects of economic growth on the labour market equilibrium. Later, other studies as Bean and Pissarides (1993), Mortensen and Pissarides (1994), or Aghion and Howitt

[9] See Garcia (1997).
[10] See xxx (199x) and xxx (199x).

(1994) have contributed to the analyses of these effects, also in the context of searching and matching models. Next section considers this question.

4. Hiring Rates, Separation Rates and Economic Growth

4.1. Effects of Economic Growth on the Labour Market

Cohen *et al.* (1997) explain the difference between the unemployment rates in France and the US in terms of the effects of economic growth on the hiring and the separation rate. The benchmark for this analysis is provided by Pissarides (1990).

Pissarides views transitions in and out of unemployment as a trade in the labour market. As an economic activity, this trade implies costs for both firms and workers: it is uncoordinated, time-consuming, and there is imperfect information in the labour market.

From the point of view of our analysis, one of the main contributions of Pissarides' work is the introduction of balanced-growth in the search-equilibrium model. The basic model is extended with the inclusion of economic growth by introducing costs of adjustment in the supply of jobs firm's decision. It is in this context that the firm views the fact of hiring or firing a worker as an investment decision. Thus, economic growth is expected to encourage hirings and reduce separations.

> "If the firm knows that in the steady state hiring costs rise at the same rate as profits, it can economize on future hiring costs by bringing forward some hiring. So, at higher rates of growth, it goes into the market with more vacancies. At lower rates of growth it pays the firm to wait, so it reduces its vacancies". Pissarides (1990), p. 30.

In the same way, but with a more complex model where both job creation and job destruction are modelled as endogenous, Mortensen and Pissarides (1994) describe the mechanisms by which recessions increase unemployment and booms reduce it. The higher the growth in the economy, the more firms retain their workers, thus the lower the separation rates, and the lower the equilibrium rate of unemployment. When considering recessions, another mechanism is at work:

> "Job destruction increases more rapidly and by more at the start of recession than it decreases at the start of the boom. The latter claim is also consistent with observations on the behaviour of unemployment, that entry into unemployment leads exit as as the cause in the rise in unemployment." Mortensen and Pissarides (1994), p. 408.

Aghion and Howitt (1994) use a search model to analyse the effects of economic growth on unemployment. In it, they consider that economic growth may have an ambiguous influence on the unemployment rate. They agree with the existence of a capitalisation effect of growth on unemployment, but they also point out the possibility of a creative *destruction effect*. This effect can increase unemployment by two channels: by reducing the duration of a job match, that increases the separation rate, or by discouraging the creation of job vacancies.

> "In the long-run, faster economic growth must come from a faster increase in knowledge. To the extent that the advancement of knowledge is embodied in industrial innovations it is likely to raise the job-destruction rate, through automation, skill-obsolescence, and the bankruptcy associated with the process of creative destruction. In short, increased growth is likely to produce an increase rate of job turnover". Alguion and Howitt (1994), p. 477.

Which of the effects of economic growth on unemployment, the capitalisation effect or the creative destruction effect dominates, has to be tested empirically.

In Cohen *et al.* (1997), hiring and firing rates are regressed on output growth and capacity utilisation. The first variable is meant to capture the capitalisation effect, by which growth increases rise the capitalised returns of job creation and reduces separations. The second variable is meant to capture the effect of the business cycle on hirings and separations. In what follows we show why interest rates should also be included as an independent variable and provide a rationale for the changes we have made in our econometric exercise compared with theirs.

The change of output through time can be expressed as in (4.1):

$$\frac{\delta y(t)}{\delta t} = gY(t) \tag{4.1}$$

where g is the growth rate of output. From (4.1) we get,

$$\frac{1}{Y(t)}\frac{\delta y(t)}{\delta t} = g \tag{4.2}$$

In order to solve this differential equation we take the integral:

$$\int_0^\infty \frac{1}{Y(t)}\frac{\delta y(t)}{\delta t}\,dt = \int_0^\infty \frac{1}{Y(t)}\,dY \tag{4.3}$$

$$= \int_0^\infty g\,dY \tag{4.4}$$

Solving the integrals, we obtain:

$$\log Y(t) + C_1 = tg + C_2 \Longrightarrow$$
$$\log Y(t) = tg + C$$

where $C = C_2 - C_1$. Getting rid of the logarithms,

$$Y(t) = e^{tg} + e^C \tag{4.5}$$

Calling $A = e^C$, we get,

$$(t) = Ae^{gt}$$

We obtain the initial value for output (Y_0) when $t = 0$. In that case,

$$Y_0 = A$$

Therefore, the steady state growth is represented by,

$$Y(t) = Y_0 e^{gt} \tag{4.6}$$

where Y_0 is the initial value for output, t is a time trend, and g, as defined before, is the growth rate of output at the steady state. In (4.6), gross output growth -and not net growth- is explained, as there is not considered any discount factor. In order to obtain the net rate at which output grows we have to add up interest rates. In this way, the present value of output, discounted by the interest rates is:

$$\bar{Y}_0 = \int_0^\infty Y_t e^{-rt} dt$$

which, once (4.6) is plugged in it becomes,

$$\bar{Y}_0 = \int_0^\infty Y_0 e^{gt} e^{-rt}\,dt$$
$$= \int_0^\infty Y_0 e^{-(r-g)t}\,dt \tag{4.7}$$

where $(r - g)$ is the net discount rate.

Therefore, our hiring and separation functions will be estimated using the following expressions:

$$\log h_t = \alpha_0 + \alpha_1 r_t + \alpha_2 g_t + \alpha_3 cu_t + \alpha \sum_i \log h_{t-i} + u_t \tag{4.8}$$

$$\log s_t = \beta_0 + \beta_1 r_t + \beta_2 g_t + \beta_3 cu_t + \beta \sum_i \log s_{t-i} + u_t \tag{4.9}$$

where h is the hiring rate[11], s is the separation rate, r is the real interest rate, g is real GDP growth, filtered using the Hodrick and Prescott filter, and cu is capacity utilization.

4.2. Results

Following Pissarides arguments, we expect that economic growth will rise the hiring rate. It should also lower the separation rate, but Aghion and Howitt show that this correlation could be of the opposite sign through a 'creative destruction effect'. As already mentioned, firms consider hires and separations as an investment decision, and therefore, interest rates affect this decision. The higher the interest rates, the more expensive the investment becomes, thus the lower should be the amount of hires and separations. A rise in interest rates makes it more expensive either to hire or to fire a worker, therefore, we expect a negative sign in both functions. Finally, we expect the effect of the business cycle to go in the same direction than the 'capitalisation effect' captured by economic growth.

The following tables show the estimated results[12].

[11] The hiring rate can be computed in two ways, as $\frac{\text{Hirigs}}{\text{Unemployment}}$ or as $\frac{\text{Hirigs}}{\text{Employment}}$. Table 4 shows the results of the regressions using the first way of calculation, and table 5 using the second one.

[12] Table A.2 in the Annex provides a full range of misspecification tests (for serial correlation, homoskedasticity, linearity, and normality) of the equations shown in tables 4, 5 and 6. In addition, table A.2 shows the R^2 and the Schwarz Bayesian Criterion (SBC).

Table 4
Spain. 1978Q1-1996Q4. Ordinary Least Squares.
Dependent Variable: Hiring Rate (h)=$\frac{\text{Number of Hires}}{\text{Number of Unemployed}}$.

	$[II]$	$[III]$	$[IV]$	$[V]$	$[rV]$
c	1.99	2.05	-0.70	-0.48	-0.48
	(1.74)	(2.58)	(-1.69)	(-1.31)	(1.32)
i	-11.92		-1.40		
	(-6.75)		(1.81)		
r^{hp}		-20.05		-5.27	
		(-12.7)		(-4.70)	
g	-22.38	-19.11	15.18	11.61	
	(-1.58)	(-1.95)	(2.57)	(2.28)	
$(r-g)$					-5.91
					(-6.07)
cu	0.027	0.039	0.011	0.018	0.021
	(1.64)	(3.74)	(1.81)	(3.51)	(4.33)
h_{t-1}			0.73	0.57	0.58
			(9.09)	(7.18)	(7.28)
h_{t-4}			0.27	0.29	0.26
			(3.16)	(3.91)	(3.76)

Note: t-statistic in parentheses.

Equation $[II]$ presents the raw results were the effect of economic growth turns out to be non-significant and with the opposite sign than expected. Interest rates have the expected negative sign and are highly significant, and the effect of the business cycle has the right sign but is hardly significant (only at 10%). The misspecification tests in table A.2 suggest important serial correlation problems, together with some heteroskedasticity. Equation $[III]$ presents the same equation but with interest rates filtered using Hodrik and Prescott's filter, as economic growth, r^{hp}. The main difference with respect to equation $[II]$ is the coefficient of interest rates that is twice the former one. Serial correlation is as strong as before. The inclusion of lagged dependent variables in the right hand side of the equation improves substantially the results, as shown by equations $[IV]$ and $[V]$.

All the variables now have the right sign with acceptable significance levels. The inclusion of the lags absorve part of the interest rates effect. Now the coefficient is much lower, but still reasonably significant. The capitalisation effect becomes clearly significant and with the right positive effect. The effect of the business cycle is lower in equation $[IV]$ than in equation $[II]$, but with higher significance and keeping the right sign. In terms of misspecification tests, we find

a well behaved equation with a very high R^2[13]. When r^{hp} is included instead of the original interest rate series (equation $[V]$), the equation experiments further improvements. The main change is the increase in the interest rates coefficient, together with a bigger t-test. The effect of the business cycle on the hiring rate also improves its significativity. The misspecification tests show a well behaved equation[14]. In order to discriminate between equations $[IV]$ and $[V]$, we use the Schwarz Bayesian Criterion (SBC), which chooses the second one.

Taking equation $[V]$ as a reference, we now test the restriction that the coefficient of interest rates equals the coefficient of economic growth: $\alpha_1 = -\alpha_2$. If this is accepted we can evaluate the net effect of a rise in economic growth[15]. Using a likelihood ratio test we compare 1.14[16] with a $\chi^2(1) = 3.84$, thus accepting the restriction. Equation $[rV]$ shows the results of the restricted equation.

We find that the 'capitalisation effect' clearly dominates the business cycle effect. Cohen *et al.* obtain that the coefficient of economic growth is 12.7 for the US and 16.0 for France. The effect of gross economic growth in the case of Spain is very similar, 11.6, although slightly smaller. In addition, the negative influence of interest rates has to be considered, and this produces further reductions on the 'capitalisation effect'. We find that the business cycle effect is also lower in the case of Spain. The coefficient on capacity utilisation is 0.018, whereas it is 0.05 in the US and 0.4 in France. Therefore, the stimulus that this effect seems to have on hirings in the US and France is twice the Spanish one.

Let's evaluate now the results when the hiring rate is computed as the number of hirings on the number of employed instead of unemployed. The estimated results are shown in the following table.

[13] Slight problems of heterskedasticity have been detected. However, when using White's Heteroscedasticity adjusted standard errors, all the coefficients, except those of the lagged dependent variables that are highly significant, improve their significativity.

[14] Again White's Heteroskedasticity standard errors provide bigger t-tests, with the only exception of the fourth lag dependent variable coefficient, which becomes 3.80.

[15] "From the condition for the supply of jobs (2.30) we now find that wether the net effect of a rise in g on unemployment is positive or negative depends on what happens to the difference $r - g$. This, however, cannot in general be determined from the SS-KE block, as the partial effect of g on r in (2.41) is greater than one. Thus, the SS curve shifts up by more than the rise in g, so wether r rises by as much as g in equilibrium depends on the slope of the two curves; that is on the strength of the inflation-tax effect and the concavity of the production function. If either is weak, the supply-side effect of the rise in g dominates $(r-g)$ falls and so in equilibrium unemployment is lower at higher rate of technical progress". Pissarides (1990), p. 38.

[16] $LR = 2\,[70.77 - 70.07] = 1.14$.

Table 5
Spain. 1978Q1-1996Q4. Ordinary Least Squares.
Dependent Variable: Hiring Rate (h)=$\frac{\text{Number of Hires}}{\text{Number of Employed}}$.

	$[VI]$	$[VII]$	$[VIII]$	$[IX]$	$[rIX]$
c	6.24 (4.40)	6.05 (5.90)	0.03 (0.07)	0.75 (1.82)	0.65 (1.69)
r	-11.37 (-5.20)		-0.95 (-1.23)		
r^{hp}		-21.25 (-10.4)		-5.72 (-3.87)	
g	59.91 (3.42)	60.54 (4.78)	3.01 (0.63)	8.69 (1.93)	
$(r-g)$					-5.76 (-3.91)
cu	-0.055 (-2.75)	-0.036 (-2.47)	0.002 (0.37)	0.002 (0.46)	0.004 (0.84)
h_{t-1}			0.73 (8.48)	0.55 (5.93)	0.56 (6.10)
h_{t-4}			0.23 (2.93)	0.25 (3.44)	0.24 (3.41)

Note: t-statistic in parentheses.

As before, the raw results are provided in the first two equations of table 5, $[VI]$ and $[VII]$. The influence of interest rates is surprisingly robust, as they keep values very similar to equations $[II]$ and $[III]$. The main changes are in economic growth and capacity utilisation. Economic growth has become significant with the positive sign, although its coefficients are unrealistically high, and capacity utilisation is also significant, but with negative sign. The misspecification tests indicate that these results are not reliable at all. Serial correlation is still very strong, and equation $[VII]$ shows also terrible problems concerning linearity and normality. When introducing lagged dependent variables in the right hand side, we obtain again well behaved equations, and reasonable coefficients. However, in equation $[VIII]$ none of the coefficients in which we are interested are significant, so we use equation $[IX]$, with the filtered interest rates series, as a reference. The SBC confirms that our choice is correct. Interest rates have a similar effect than before (-5.72) and are still highly significant. The 'capitalisation effect' is still significant, but has reduced its influence (its coefficient is 8.69), and finally we find a non-significant effect of the business cycle on the hiring rate computed in this way. The restriction on the interest rates and the economic growth coefficient

is again accepted[17].

Defined as hirings on employed, therefore, we find that the hiring rate is less responsive to the 'capitalisation effect' and the business cycle effect, that becomes non-significant. At the same time, the negative influence from interest rates is slightly stronger.

Table 6 shows the results on the separation rate function.

Table 6
Spain. 1978Q1-1996Q4. Ordinary Least Squares.
Dependent Variable: Separation Rate (s)=$\frac{\text{Number of Separations}}{\text{Number of Employed}}$.

	$[XI]$	$[XII]$	$[XIII]$	$[IVX]$	$[XV]$	$[XVI]$
c	6.31 (4.41)	6.18 (5.18)	2.97 (2.25)	4.20 (3.61)	2.68 (1.87)	4.59
r	-9.12 (-4.13)		-3.39 (-1.42)		-6.18 (-2.84)	
r^{hp}		-16.86 (7.12)		-13.88 (-5.10)		-15.86 (-5.95)
g	-31.65 (-1.79)	-30.92 (-2.10)	-14.42 (-0.89)	-32.30 (-2.44)	-27.44 (-1.73)	-38.41 (-2.91)
$(r-g)$						
cu	-0.053 (-2.61)	-0.038 (-2.25)	-0.026 (-1.49)	-0.019 (-1.33)	-0.015 (-0.79)	-0.019 (-1.23)
s_{t-1}					0.45 (4.02)	0.16 (1.42)
s_{t-4}			0.58 (4.63)	0.27 (2.35)		
$s3$			-0.16 (-1.61)	-0.27 (-3.12)	-0.32 (-3.59)	-0.35 (-4.63)

Note: t-statistic in parentheses;
$s3$ stands for a seasonal dummy accounting for summer.

Equations $[XI]$ and $[X]$ present the results without any lagged coefficient. As expected, all the signs are negative and all the variables reasonably significants. Again, though, the serial correlation test indicates the existence of some misspecification problems, so we try to improve the results by adding lagged dependent variables, and a seasonal dummy ($s3$), that captures the negative effect of summer on separations. The lagged structure of the separation rate function is different than the hiring function one. Now we consider either the first or the fourth lag

[17] $LR = 2\,[73.86 - 73.60] = 0.52$, smaller than $\chi^2(1) = 3.84$.

of the dependent variable, but not both together as with the hiring rates. In any case, results with the original interest rate variable are poorer than results using the filtered ones, not only in terms of the t-tests, but also in terms of the misspecification tests and the SBC. Therefore we consider equations $[XIV]$ and $[XVI]$, and, on the basis of the misspecification tests and the SBC, we choose equation $[XIV]$ with the dependent variable fourth lag in the right hand side of the equation. In terms of coefficients and t-statistics, though, both equations provide similar results.

The 'capitalisation effect', with a coefficient of 32, has a much stronger negative influence on the separation rate than positive on the hiring rates. Interest rates have also a stronger influence on separations than on hirings. Finally, the business cycle has the expected negative sign, but it would be significant only at 20%.

Cohen *et al.* obtain a similar influence of economic growth on the separation rate in the US and France. The coefficient for France is 16.3 and the long-run coefficient for the US is 18.1. Our results indicate that the negative effect of growth on separations is twice bigger in Spain than in the other two countries. The difference of France with respect to the US is found in the effect of the business cycle. While in the US there is a significant negative influence from the business cycle (-0.02), in France there is not such an influence, something that is coherent with the reduced magnitude of the flows out of unemployment in France with respect to the US. In this sense the Spanish labour market is closer to the French one, with a non-significant influence from the business cycle.

. In summary, we have found that the positive effects on the hiring function in Spain -economic growth and business cycle- are smaller than in the other two countries. If we add the fact that there is a strong effect of interest rates in reducing the amount of hirings, we may be in front of an important explanation of why it is difficult to create employment in Spain. On the other hand, the influence of economic growth in the separation function is bigger than in the US and France. This indicates that when economic growth is low unemployment is more sensitive than in the other two countries, hence it is easier to experience 'jumps' in the unemployment rates. This is confirmed by the increase in the unemployment rates during the last two recessions in Spain, the first one in 1975-1985 and the second one in 1991-1994. In addition, Spanish hiring and separation functions are less sensitive to the business cycle than in the other two countries. This could help to explain why persistence in unemployment seems to be higher than in other countries. Finally, interest rates appear to have a strong influence on hirings and separations. During the eighties, and even at the beginning of the nineties, Spain experienced very strict monetary policies that maintained very high the interest rates. This may have been another important factor in the explanation of the high unemployment rates in Spain related to other European

countries and, of course, the US.

5. Conclusions

In section 2 we have seen that one of the possible sources of the high unemployment rate differentials in Spain, related to other countries, is the increase in female participation in the labour market. This phenomenon occurred in a short period of time and late compared with other experiences. Section 3 has shown that the Steady State unemployment rate, computed using hirings and separations crutially depends on economic growth, something that has been theoretically analysed in the last years. Our empirical exercise in section 4 has confirmed the key role of economic growth in explaining the hiring and the separation rate, and therefore unemployment. We have seen that countries such as France and the US are much more stable in front of changes in economic growth than Spain, and that the Spanish separation function is especially sensitive to economic growth, rather than the business cycle.

The combination of these elements provide a reasonable explanation of the rise in the unemployment rate in Spain that started from very similar levels at the beginning of the seventies. During the period 1975-1985 economic growth did not contribute to job creation, and on the contrary provides a good reason for job destruction and the rise in unemployment. During the period of extremely high economic growth rates in the second half of the eighties, job creation was extremely high, with almost two milion of new jobs. However, a shock in the labour force, leaded by the incorporation of women to the labour market, prevented the unemployment rate to be reduced by more than five points. A new recession at the beginning of the ninenties, when the separation rate starts increasing sharply, confirms the sensibility of the Spanish economy to the changes in economic growth. Finally, the last period since 1994, shows a reduction in the unemployment rate in the context of an expansion. However, the separation rate keeps increasing at a similar rates than in the last recession, something that is accompanied by an increase in the hiring rate. This phenomenon is the consequence of the 1994 labour market reform that mainly reduced severance payments. This reduction implies that hirings and firings are less 'risky', if viewed as an investment. Another factor that has helped the increase in the hiring and the separation rate is the continous reduction in interest rates in the last years.

Changes in the labour market regulation in 1997 go in the same direction than the 1994 reform. However, despite unemployment show a steady donward trend in the last years, some persistent mechanisms seem to be obstructing bigger reductions. This fact indicate that labour market reforms such as the one in 1994

and the collection of measures of 1997, are helpful but not enough to reduce the unemployment rate back to the European standards. The results obtained in this paper point directly to economic growth and the sources of economic growth as an irreplaceable complement.

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6. Annex

Table A.1
Composition of Total Labour Force. 1990.

Age	*Share*	*Education*	*Males*	*Females*	*Total*
All		Very High	6.40	5.32	11.72
		High	24.59	15.54	40.13
		Medium	26.43	10.86	37.29
		Low	7.25	3.61	10.86
	100.0	*Total*	64.67	35.33	100
16 to 24 years old		Very High	1.53	3.55	5.08
		High	40.79	33.96	74.75
		Medium	11.82	6.52	18.34
		Low	1.21	0.62	1.83
	20.1	*Subtotal*	55.35	44.65	100
25 to 54 years old		Very High	7.90	6.49	14.39
		High	23.02	12.69	35.71
		Medium	28.40	11.92	40.32
		Low	6.40	3.18	9.58
	66.7	*Subtotal*	65.72	34.28	100
More than 55 years old		Very High	6.25	2.10	8.35
		High	7.80	1.88	9.68
		Medium	38.67	12.16	50.83
		Low	20.79	10.35	31.14
	13.3	*Subtotal*	73.51	26.49	100

Table A.2
Misspecification Tests.

	R^2	SC $\chi^2(4)$	LIN $\chi^2(1)$	NOR $\chi^2(2)$	HET $\chi^2(1)$	ARCH $\chi^2(1)$	SBC
$[I]$	0.03	68.36	0.01	3.32	2.87		-43.33[1]
$[II]$	0.40	56.51	3.45	2.08	3.94		-29.01[1]
$[III]$	0.70	53.11	16.52	2.17	1.19		-2.91[1]
$[IV]$	0.94	9.47	1.59	0.54	6.63		42.29
$[V]$	0.95	6.12	0.12	1.22	6.82		57.94
$[rV]$	0.95	6.61	0.43	1.60	6.40		59.38
$[VI]$	0.52	53.81	1.04	0.99	0.05		-45.20[1]
$[VII]$	0.74	42.85	9.13	151.6	0.68		-22.31[1]
$[VIII]$	0.97	8.68	1.59	0.37	8.17		54.50
$[IX]$	0.97	7.69	0.92	3.33	7.87		61.03
$[rIX]$	0.97	7.71	1.26	3.40	8.40		62.91
$[X]$	0.26	38.06	0.01	0.82	0.34		-49.88[1]
$[XI]$	0.40	27.14	0.66	2.44	2.33		-45.93[1]
$[XII]$	0.57	19.47	2.78	4.48	3.76		-33.78
$[XIII]$	0.66	20.10	3.90	0.17	8.50		-28.53
$[XIV]$	0.75	9.56*	0.41	3.78	5.67		-17.64
$[XV]$	0.64	10.17	0.0	5.56	1.38		-30.74
$[XVI]$	0.73	7.4	2.57	11.69	1.20		-19.45

Note: t-statistic in parentheses.
$^{(*)}$: $F-Test(4,62) = 2.37$; $^{(1)}$: calculated with 76 observations, otherwise 72.
5% Critical Values: $\chi^2(1) = 3.84$, $\chi^2(2) = 5.99$, $\chi^2(4) = 9.49$.

Table A.3
Hiring and Firing rates for France and US.

Dependent variable: hiring rate=$\frac{\text{hirings}}{\text{unemployed}}$

	c	g	gap	d^{74-84}	$h(-1)$	R^2	DW
US	1.3	12.7 (5.4)	0.05 (6.7)			0.74	1.8
FR	-1.4	14.6 (6.3)	0.04 (2.7)			0.80	1.02
FR	-1.46	16.0 (9.3)	0.035 (3.0)	0.12 (4.2)		0.91	2.1

Dependent variable: firing rate=$\frac{\text{firings}}{\text{unemployed}}$

	c	g	gap	d^{74-84}	$s(-1)$	R^2	DW
US	-0.7	-15.0 (-5.2)	-0.04 (-4.4)			0.64	1.3
FR	2.2	-15.9 (-5.2)	-0.004 (-4.4)			0.64	0.3
US	-0.24	-7.6 (-3.4)	-0.02 (-4.0)		0.58 (6.1)	0.85	1.3
FR	2.3	-16.3 (-8.9)	-0.0 (0.0)	-0.07 (-2.7)		0.85	1.8

Note: sample period for US is 1964-1991, for France is 1971-1991.
Source: Cohen, Lefranc and Saint-Paul (1997).

Figure 6.1: Hiring Rate(=Hirings/Unemployment)

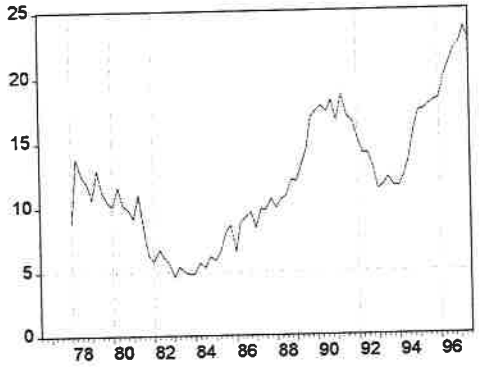

Figure 6.2: Hirng Rate=(Hirings/Employment)

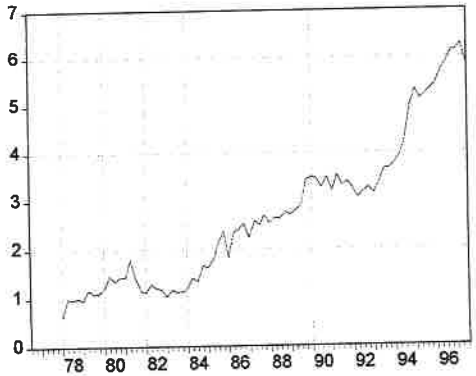

Figure 6.3: Hiring Rates

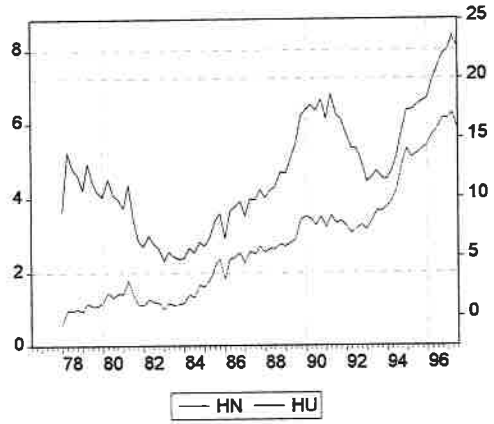

Figure 6.4: Separation Rate=(Hirings/Employment).