# A COMPARATIVE ANALYSIS OF THE AGGREGATE MATCHING PROCESS IN FRANCE, GREAT BRITAIN AND SPAIN

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Banco de España - Servicio de Estudios
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## Abstract

Recent research attempting to understand the behaviour of unemployment, and more generally the labour market itself, has emphasised the need to further our understanding of labour market dynamics. Underlying this approach is the assumption that labour markets are characterised by a constant turnover of both workers and jobs, with a matching mechanism playing a fundamental role in describing the way in which these two flows meet. A key feature of these theories is that the matching mechanism, which is assumed to characterise the search process of individuals attempting to find a job and firms looking to fill a vacancy, can be analysed from an aggregate perspective and approximated by a simple matching function. On the basis on somewhat limited empirical work, it has however, tended to appear in the literature as a reduced form description of the search process, which is best approximated a constant returns to scale Cobb-Douglas function, relating the flow of new hires to the stock of unemployment and vacancies. In light of the ambiguity which arises from existing empirical work as to the characteristics of this function, this paper provides a comparative analysis of the matching process in France, Great Britain and Spain, adopting what we feel to be a more systematic approach to the econometric modelling of this function and using a more reliable data set. In contrast to existing work in this area, whilst our results support the existence of an aggregate matching function in all three labour markets, we do not find overwhelming evidence for what has become the somewhat standard assumption in theoretical research of a constant returns to scale in the matching technology. Instead the function would appear to exhibit increasing returns in both Great Britain and Spain and decreasing in France. Perhaps more importantly however, given the ramifications for both empirical and theoretical research in this area, a number of our results would tend to draw into question the appropriateness of the standard specification within a European context.

**1 Introduction:**

Recent research (see Blanchard and Diamond (1989, 1990, 1994) and Pissarides (1986)) has tended to turn away from the conventional approach to unemployment emphasising instead the necessity of understanding the dynamics of the labour market. Underlying this approach is the assumption that labour markets are characterised by a constant turnover of both workers and jobs, with a matching mechanism playing a fundamental role in describing the way in which these two flows meet. A key feature of these theories is that the matching mechanism, which is assumed to characterise the search process of individuals attempting to find a job and firms looking to fill a vacancy, can be analysed from an aggregate perspective and approximated by a simple matching function. Thus the function appears as a reduced form description of the search process, taking on a role similar to that of the aggregate production function in production theory.

On the basis of somewhat limited empirical work the matching function has tended to be best approximated in theoretical work by a constant returns to scale (CRS) Cobb-Douglas function, which relates the flow of new hires to the stock of unemployment and vacancies. Embodying such a matching function in a structural model of the labour market, it can be shown that the assumption of constant returns to scale ensures the uniqueness (although not existence) of the equilibrium. Somewhat more interesting implications arise however, if the matching function is found to exhibit increasing returns. For, under certain conditions increasing returns in the matching technology can give rise to multiple equilibria (see Diamond 1982), which could then offer one explanation for why economies appear "stuck" at high levels of both unemployment and vacancies.

Yet, despite a growing literature in this area, existing empirical work does not provide overwhelming support for either the existence of such functions or much consensus as to their long run characteristics. The data appearing to support the existence of a conventional matching function exhibiting constant returns to scale in both the United States (Blanchard and Diamond (1989 and (1990) and the Netherlands (van Ours (1992) and decreasing returns in Australia (Smith (1992)). Empirical work in Britain (Pissarides (1986) and Jackman, Layard and Nickell (1991) has however, had somewhat varied success. Attempts to reconcile these inconsistencies are hampered by the fact that: a) there appears to be no standardisation of either the data used for estimation or the econometric methodology adopted; and b) research has been carried out on a number of different specifications of the matching function.

In this study therefore we provide a comparative analysis of the matching process in France, Great Britain and Spain, adopting what we feel to be a more systematic approach to the econometric modelling of this function and using a more reliable data set. The objective being, given the central role that

the aggregate matching function plays in the flows approach to unemployment, to determine: a) whether the concept of an aggregate matching function receives support from European data; and b) the extent to which the standard specification, originally developed for the US market, is appropriate within a European context. In the final section of the paper, we go on to utilise this framework to assess the impact of changes in a number of institutional characteristics of these labour markets on the efficiency of the aggregate matching process.

An interesting feature of this analysis is that the choice of countries enables us to analyse the determinants of the matching process in labour markets with very different cultural and institutional characteristics, differences which one would expect to have a fundamental impact on the long run characteristics of the matching function. From an institutional point of view, perhaps the most differentiating feature is the nature of labour market regulation in these economies. Of the European markets the British market is the one that most resembles the flexible model of the US. The Spanish market on the other hand is, despite recent changes to increase flexibility, much more akin to one's perception of the European model, with a larger public sector and a highly regulated labour market. France is generally considered to lie somewhere between these two extremes, although it is located more towards the Spanish end of the spectrum than the British.

**2 The Aggregate Matching Function:**

A natural starting point for our analysis is the standard aggregate matching function à la Blanchard and Diamond (1989), which has proved to be so influential for empirical work in this area. In contrast to other work, no prior assumptions will be made with respect to the functional form of this relationship, except that it is best approximated by the following Cobb-Douglas relationship which relates the flow of new hires to the stock of unemployment and vacancies:

$$H = CU^{\alpha}V^{\beta}e^{\varepsilon}, \qquad 1)$$

where $\varepsilon$, the error term enters the function multiplicatively and is assumed to be: $\varepsilon_t \approx IN(0,\sigma^2)$, H represents the number of new hires, U, the level of unemployment and V, the level of vacancies. The marginal propensities $h_U$ and $h_V$ are assumed to be positive and decreasing i.e. $h_U \geq 0$ and $h_V \geq 0$, $h_{UU} \geq 0$ and $h_{VV} < 0$. As in aggregate production theory, C is a scalar parameter introduced in order to capture the total factor productivity of the function.

It is important to note however, that changes in the efficiency of the matching function pose considerable problems for time series estimation. For, although it may be appropriate in cross sectional analysis to assume that at a specific point in time the efficiency of the matching technology is given, and that

the appropriate function for estimation is that given by equation one, such a specification is clearly inappropriate for times series analysis, since changes in the quantitative efficiency with which a match occurs are not likely to remain constant over time. On the contrary, shifts in the matching function will occur as factors which affect the overall level of efficiency of the function are themselves subject to change. In practice the efficiency of the matching technology will be dependent on factors, such as: the accumulation of experience about search methods, increased effectiveness of job searchers; the introduction of new search methods, labour market institutions and policies; and the existence of both search imperfections and mismatch between the unemployed and vacancies. The effectiveness of the unemployed will itself be affected by: a) increases in the choosiness of employers (caused for example, by: rigid employment protection laws; greater uncertainty with respect to prevailing economic conditions; and an increase in the numbers of long term unemployed); and b) changes in the overall degree of motivation of job searchers (as a result of changes in the level of replacement ratios, benefit durations and eligibility conditions and the prevailing general economic conditions)[1].

To allow for such time variant changes in efficiency, we include a number of explanatory variables in our regressions which might reasonably be expected to have affected the efficiency of the matching process over our sample periods. Doing so the specification for estimation becomes:

$$H = C^{\gamma_1} \cdot U^{\alpha} \cdot V^{\beta} \cdot MM^{\gamma_2} \cdot SI^{\gamma_3}, \qquad 2)$$

where: $MM$ represents an index of mismatch; $SI$ captures changes in the effectiveness of the unemployed; $H_U > 0$; $H_V > 0$; $H_{MM} < 0$; and $H_{SI} > 0$. In other words, new hires are assumed to be an increasing function of both unemployment, vacancies and the effectiveness of the unemployed, but a decreasing function of mismatch. Clearly if $\gamma_2 = \gamma_3 = 0$, then the variables included to allow for time variant changes in efficiency would appear to be irrelevant to the matching relationship and the function reduces to the standard specification à la Blanchard and Diamond. Taking logarithms of equation two the long run relationship of interest becomes:

$$h = c + \gamma_1 time + \alpha u + \beta v + \gamma_2 mm + \gamma_3 si. \qquad 3)$$

The absolute growth of efficiency over our sample period is therefore given by $c + \gamma_1 + \gamma_2 + \gamma_3$. Including proxies for mismatch and search intensity enables us however, to detract from the total change in efficiency that which can be attributed directly to these factors. From this perspective then, this type of analysis could

[1] We use the term intensity interchangeably to represent factors which affect the unemployed's degree of effectiveness as job-seekers and the fact that firms and the unemployed may not all necessarily search with the same degree of intensity to form a successful match.

help with the identification of those areas which should be targeted by labour market policy in order to increase the overall level of efficiency of matching.

**2.1 The Data:**

A brief review of the existing literature highlights the fact that this type of empirical research is plagued with problems of data reliability. Concern has tended to focus, because of problems of poor coverage, on the reliability of results based on official vacancy data, yet the most fundamental problem for existing empirical work is the lack of data on the number of new hires. As a consequence researchers have in effect tended to estimate aggregate unemployment outflow functions, using aggregate outflows from unemployment as the dependent variable and not aggregate matching functions[2]. An important point of departure of this work is that in contrast to other studies, the empirical specification estimated in this paper would appear to be more representative of the theoretical concept of an aggregate matching function in that total hires and not outflows from unemployment (as in the work of Pissarides (1986), Burda and Wyplosz (1994), Burda (1994), Lehman (1994) and Smith (1993)) are used as the dependent variable.

In the British analysis we use a previously under-utilised series of the total number of new hires in Great Britain constructed from individual tax records. It is possible to construct a new hires series in this manner for the UK simply because each time an individual leaves a job the Inland Revenue (the tax authority in the UK) provides, via the employer, the individual with a tax certificate (P45) which lists a number of the individual's tax details. By law, the individual is then obliged to pass this certificate on to his new employer, who in turn returns it back to the tax office, thus providing the tax authorities with an updated record of the individual's employment history. New entrants do not slip through this recording net, since a firm has to fill a different tax return (P46) for all new employees, who do not present them with a P45 certificate when they commence employment. Theoretically speaking then, the Inland Revenue has a record of all job to job transitions within the economy, together with all transitions from out of the labour force to employment.

For the French analysis we construct a new hires series using official data on unemployment outflows disaggregated according to sex and reason, published by the *Ministère du Travail*. More specifically, we take the number of outflows from unemployment to employment as a proxy for the number of new hires in the economy. We argue that this measure is more consistent with the theoretical concept of a matching function than the unemployment outflows measure previously used by Burda and Wyplosz, since a large proportion of total outflows from French unemployment is to either training schemes or non-

[2] Exceptions to this being the disaggregate work of Burgess and Anderson (1995) and the original study by Blanchard and Diamond (1990). As argued in Bell (1995) however, the construction of the new hires series in the latter study throws some doubt on its reliability.

employment labour market states. Moreover, the statistics indicate that approximately 70% of individuals entering training schemes return to unemployment on completion of their course.

Two possible sources exist for the construction of a Spanish new hires series: the total number of "*contratos*" or "*colocaciones*" registered each month at *INEM* (*Instituto Nacional de Empleo* - the Spanish national employment agency). The distinguishing feature between these two definitions being that in order for a *contrato* to be considered a *colocacion*: a) the firm has to have first registered the vacancy with INEM prior to the contract begin signed; and b) the worker filling the vacancy has also to have been previously registered as being unemployed with INEM. *Contratos* on the other hand, cover any new hire registered with INEM regardless of whether the associated vacancy or person signing the contract had previously been registered with them. Although the number of *contratos* each month can be argued to provide a more complete definition of the number of new hires in the economy in this work we use the total number of *colocaciones* at INEM, given that data on total *contratos* is only available from 1984 onwards[3].

Our measure of unemployment for France, Great Britain and Spain is taken from the official series of the stock of registered unemployment published in the monthly labour statistics bulletins of the government agency responsible for employment, respectively, the *Ministère du Travail*, the Department of Employment and *INEM*. For, the French and British vacancy series we take the official data on the number of unfilled vacancies at the end of the month as a proxy for the total number of vacancies on offer in the economy, assuming that official vacancies are proportional to the total number of vacancies in the economy as a whole, and that this proportion has remained relatively stable over the sample period[4]. Our Spanish measurement of vacancies is constructed using the methodology of Antolin (1993, p.6-7). This procedure essentially provides a correction to the official vacancy series again to allow for those vacancies which not filled through the National Employment Office[5]

To assess the impact of changes in the effectiveness of the unemployed on the numbers of new hires for a given level of unemployment and vacancies, we investigate the relevance of a number of variables, such as: the generosity of the benefit system (in terms of average amount paid and the extent of

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[3] Note, that although technically speaking the Spanish employment services records provide a complete record of the number of new hires in the economy, since firms are legally obliged to register an employment contract with *INEM*, we do encounter a potential timing problem with the Spanish series. For, prior to the 1994 legislation firms were only obliged to notify the contract to *INEM* at some point during the contract life, thus notification did not necessarily have to take place at the time the actual hiring occurred.

[4] As we are using official vacancies as a proxy for the total number of vacancies in the economy one should, given the policies adopted by the British Government during the period 1968-1974 to increase the effectiveness of the public employment services, allow for changes in the ratio of employment centre vacancies to total vacancies over the estimation period. The official vacancies series for Great Britain is therefore adjusted according to the method outlined in Jackman et al. (1989). To summarise, this procedure involves correcting the official vacancy series according to its share of economy wide vacancies.

[5] Following the work of Gomez and Dolado (1995) a correction factor of 0.25 is applied to the official vacancy series.

benefit coverage); family status; replacement ratios; and the proportion of disenfranchised groups (i.e. the long term unemployed, women and youths), factors argued in the literature to be important determinants on the search intensity of the unemployed. In light of the predominance of the mismatch argument in both the economic and political debate, we also assess the impact of changes in the degree of regional, skill, and industrial mismatch[6].

Assessing the impact of changes in the degree of search intensity of firms on the matching function is somewhat more problematic. For, whilst it seems reasonable to assume, given issues of credibility and the economic conditions of the past 20 years, that a firm will only advertise a vacancy when: a) there is a position to be filled; and b) they are actively involved in filling it, firms undoubtedly differ in the search intensity of their recruitment drive. It is difficult however, to allow for these effects on the demand side of the market in empirical work, since factors which affect search intensity also affect a firm's decision to open a vacancy. Despite this drawback, one important factor investigated is the affect on the matching function of the changes in employment protection legislation which have taken place since the early 1970's. The idea being that one would have expected the increasing trend for tighter regulation during the 1970's and the partial relaxation of the 1980's to have had a significant impact, at a given level of unemployment and vacancies, on both a firm's desire to hire and their level of choosiness with respect to potential employees, and thus ultimately on the degree of effectiveness of the unemployed.

The French approach to labour market deregulation has unfortunately been somewhat erratic, with the deregulation policies which were enacted in order to introduce greater labour market flexibility often being followed by the imposition of tighter controls. This is especially true of regulations regarding the use of temporary and short term contracts, making it is somewhat difficult to pick up these effects in econometric estimations. The main developments in French labour market regulation which might have been expected to have had an impact on the characteristics of the aggregate matching function over our sample period are: the introduction of fixed term contracts in 1979, allowing firms to hire staff on fixed term contracts, which were not subject to the usual stringent regulations regarding employment conditions and dismissals; the 1982 government regulations restricting the use of temporary workers, which were subsequently extended by the Socialist Government in 1985 with the introduction of new legislation extending the maximum duration of these contracts and expanding the number of justifiable reasons for not

[6] In order to obtain an accurate measure of industrial mismatch data on the unemployed classified according to their last job are required. Unfortunately time series data at the required frequency level do not exist in Great Britain for the whole of our sample period. For the British estimations we adopt therefore the approach taken by Nickell and Layard (1986) and Pissarides (1986), this being to use an indicator of industrial turbulence (the absolute change in industrial and production industries employment as a percentage of total civilian employment) as a proxy for the degree of industrial mismatch.

converting them into permanent employment; the 1986 legislation, which abolished the necessity for firms to obtain Government consent before the dismissals of workers, but imposed on firms with more than 50 employees the legal obligation to formulate a social plan when dismissing more than 10 workers; and finally, the shift in regulatory preferences with the change in Government in 1989 towards tighter regulation in the sense that: a) a limited number of reasons was again introduced governing the use of the temporary contracts; and b) the role of the public authorities was extended, with the need for prior approval for a social plan in the event of collective redundancies and a prolonging of the administrative procedures prior to redundancy. It is important to note however, that as our measure of French new hires only relates to engagements to permanent full time positions, the impact of legislation concerning the use of temporary and short-term contracts can only be expected to have an indirect impact on the French matching process. Indirect, in the sense that the loosening of restrictions on the use of these types of contracts might be expected to ease the overall hiring process for both temporary and permanent jobs.

In the British analysis we examine the effects of the following changes to employment protection legislation: the 1971 Unfair Dismissals Act under which workers were given the right to unfair dismissal; the Employment Protection Act 1975, which extended periods of notice given before a job termination; and the 1980 and 1982 Employment Acts, which led to a relaxation of regulation in an attempt to increase labour market flexibility. Under the 1982 act for example, the right to unfair dismissals no longer applied to those with less than two years experience. A priori one would expect the 1971 and 1975 legislation to have a negative effect on the hiring process, in that they imposed more stringent firing regulations and the 1982 act to have a positive effect, since it loosened the regulations regarding the dismissal of workers.

The most significant change in Spanish employment protection legislation, in terms of its likely impact on the characteristics of the Spanish matching function, would appear to have been the reform (*Ley 32/84 Acuerdo Economico y Social*) of the Workers Statute (*Ley del Estatuto de Los Trabajadores* 1980), which was brought into force at the beginning of 1985. To summarise, these reforms introduced new regulations to widen the scope for the use of fixed-term and temporary contracts, which although allowed for under the 1980 act had not previously been used extensively. From 1985 onwards firms were able to employ workers under temporary, fixed term, training/apprenticeship and part-time contracts. The main advantage of the former two types of contracts being that firing costs, in terms of both severance payments and workers rights against dismissal workers are significantly lower than for those individuals employed under permanent contracts, since temporary contracts do not incur obligatory severance pay upon termination and workers under fixed-term contracts do not have the right to sue their employer for unfair

dismissal. Finally, we include a dummy variable to allow for the change to the system of registration introduced in January 1994 of all new contracts at INEM. In addition to the inclusion of the appropriate dummy variables, we also attempt in the Spanish analysis, to incorporate the changes in the nature of the employment protection system by allowing for the number of cases brought before both Conciliation bodies and the Courts, together with the proportion of these which were awarded in favour of the employer.

**2.2 Methodology and Results:**

Preliminary DF tests and ADF tests suggested that the logarithms of all of the series used in the estimation procedure were integrated to order one. An analysis of the residuals did however, indicate the presence of outliers and structural breaks, which could have biased the results towards one forcing us to accept the hypothesis of integration. The unit root tests were re-estimated using the Perron (1989) procedure for testing in the presence of structural breaks and outliers. Unfortunately these latter test results proved inconclusive, being largely dependent on model selection. In light of this inability to reject the null hypothesis of non-stationarity in the data we proceed to estimate using OLS the following general dynamic error correction regression specification with differences and lagged levels of the dependent and explanatory variables (see Hendry (1987), implementing prior to estimation the Johansen's (1989 and 1990) Full Information Maximum Likelihood procedure to ensure for the presence of a cointegrating vector[7]:

$$\Delta h_t = \alpha_0 + \gamma Time + \Delta\sum_{i=1}^{k} \alpha_{1i} u_{t-i} + \Delta\sum_{i=1}^{k} \alpha_{2i} v_{t-i} + \Delta\sum_{i=1}^{k} \alpha_{3i} mm_{t-i} + + \Delta\sum_{i=1}^{k} \alpha_{4i} si_{t-i} + \beta_1 h_{t-1} + \beta_2 u_{t-1} + \beta_3 v_{t-1} + \beta_4 mm_{t-1} + \beta_5 si_{t-1} + S_1 + S_2 + S_3 + \varepsilon \quad 4)$$

where: lower case letters represent natural logarithms; $\Delta$ first order differences; $u$, the unemployment stock; $v$, the registered vacancy stock; $mm$ denotes an index of the degree of mismatch; $si$, changes in search intensity and $S_1, S_2, S_3$ are dummy variables included to capture seasonal effects. Due to data constraints we were unable to carry out the analysis for each country over the same time period. The French estimations are therefore carried out over the period 1979.I to 1994.IV, the British, over the period 1967.I to 1985.IV and the Spanish over the period 1980.I to 1995.IV.

In table one we report both the results of the estimation of the standard specification à la Blanchard and Diamond (abbreviated in the table to Stan) and those of the specification which explicitly allows for factors affecting the efficiency of the matching function. Focusing initially on the estimation of the standard specification, it is evident that the results obtained are somewhat mixed. In contrast to a priori

[7] These results do however, suggest the presence of more than one cointegrating vectors in all of the regressions. In such cases, the Hendry technique described above is argued to be preferable, since the Johansen approach does not provide us with any indication as to which of these two vectors should be used in our analysis of the long run.

expectations we find that: a) vacancies enter the French specification in a negative, but insignificant manner, and b) increases in unemployment in Spain are found to have a significant negative impact on the matching process. Only the British results would appear to be consistent with the underlying theory, in that unemployment and vacancies enter in a positive manner. These results would not then appear to be consistent with the implicit assumptions of the standard specification, nor do they offer overwhelming support for the assumption commonly found in both the empirical and theoretical literature of a matching technology which exhibits constant returns to scale.

**Table One:**

Long Run Parameters of the Aggregate Matching Function in France, Great Britain and Spain: (t-statistics in parenthesis)

| Variables | France Stan | France | GB Stan | GB | Spain Stan | Spain |
|---|---|---|---|---|---|---|
| time trend | -0.15 (-2.89) | | -0.02 (-3.17) | | 0.02 (3.18) | |
| unemployment | 0.74 (1.86) | 0.58 (2.26) | 0.64 (2.8) | 0.18 (2.08) | -0.53 (-1.47) | 0.88 (1.70) |
| vacancies | -0.04 (-0.55) | 0.09 (1.74) | 0.70 (2.5) | 0.40 (2.87) | 0.13 (0.97) | 0.35 (1.53) |
| benefit effect | | -0.24 (-2.21) | | -0.53 (-1.22) | | -1.04 (-1.85) |
| prop U who are youths | | -0.51 (-2.38) | | | | -4.93 (-2.95) |
| regional mismatch | | -0.06 (-3.54) | | -0.12 (-2.39) | | -0.68 (-1.06) |
| structural change | | | | | | 1.93 (1.62) |
| proportion U female | | 1.50 (2.80) | | | | |
| proportion U very long term | | -0.12 (-1.37) | | | | |
| **Legislation** | | | | | | |
| France 1986 | | 0.11 (3.09) | | | | |
| France 1989 | | -0.16 (-2.85) | | | | |
| Spain 1984 | | | | | | 0.41 (1.74) |
| Spain 1994 | | | | | | 0.40 (1.86) |
| Great Britain 1975 | | | | -0.36 (-4.14) | | |
| Great Britain 1980 | | | | -0.28 (-4.07) | | |
| **Diagnostics** | | | | | | |
| R Bar $^2$ | 0.73 | 0.82 | 0.80 | 0.85 | 0.43 | 0.51 |
| LM Correlation | F(4,42)=0.18 | F(4,34)=0.32 | F(4,50)=1.10 | F(4,47)=0.19 | F(4,45)=0.61 | F(4,44)=1.25 |
| Ramsey Reset Test | F(1,45)=0.54 | F(1,41)=0.30 | F(1,53)=.072 | F(1,50)=3.95 | F(1,48)=0.24 | F(1,55)=1.95 |
| Normality | $Chi^2$(2)= 0.47 | $Chi^2$(2)= 0.54 | $Chi^2$(2)= 0.47 | $Chi^2$(2)= 0.20 | $Chi^2$(2)= 0.32 | $Chi^2$(2)= 1.79 |
| Heteroskedasticity | F(1,57)=0.65 | F(1,57)=0.02 | F(1,69)=0.30 | F(1,69)=0.20 | F(1,59)=0.00 | F(1,58)=0.23 |
| Stability | F(20,26)=3.49 | F(20,22)=1.89 | F(17,37)=1.11 | F(17,34)=0.2 | F(12,40)=1.25 | F(21,26)=1.25 |
| CRTS Restriction | $Chi^2$(1)=26.09 | $Chi^2$(1)=5.48 | $Chi^2$(1)=5.86 | $Chi^2$(1)=33.15 | $Chi^2$(1)=28.82 | $Chi^2$(1)=11.54 |

An obvious explanation for the "lack of success" of our estimations of the standard specification is that whilst it may be an appropriate approximation of the aggregate matching process in high turnover countries such as the US, its appropriateness within a European context, where sluggish adjustment and long term unemployment are more prevalent, is much more debatable. In actual fact, the results of our estimations of the specification in which we explicitly allow for a number of factors affecting the overall efficiency of the matching technology would appear to have been somewhat "more successful". In that the

data would appear to support the existence of a stable aggregate matching function in the British, French and Spanish labour markets, well approximated by a Cobb-Douglas function in which both the demand and the supply side of the labour market play a significant role in the hiring process. In contrast to earlier studies however, we once again fail to find overwhelming evidence of constant returns to scale. If anything the function would appear to exhibit slightly increasing returns in both Great Britain and Spain and decreasing returns in France. In what follows we confine our discussion of the results to the more general model, given that standard hypothesis tests indicate that the specification which explicitly allows for factors affecting the efficiency of the matching process is the statistically preferred specification.

The first thing one notes from table one, is that we obtain a much lower impact on the hiring process from the demand side labour market than that found by previous studies[8]. As is argued by Blanchard and Diamond (1989) this lower value could be due to the fact that the estimation of the matching function using quarterly data subjects the analysis to a considerable amount of information loss, since the average duration of a vacancy has been reported to be less than three months. To assess the relevance of this argument the French aggregate matching function was re-estimated using monthly data. Yet despite estimating the matching relationship at the highest possible frequency, our monthly estimations still report significantly lower values than those obtained elsewhere, the results being comparable to our quarterly estimations. It would appear more likely therefore, that coverage and not information loss due to the frequency level of the data used in our estimations, is a significant factor behind our comparatively lower coefficient values. Although one should note that these differences could also be due to some extent to differences in the dependent variable. It is possible for example, that the use of unemployment to employment flows, as opposed to total hires, as the dependent variable will result in vacancies being underweighted with respect to unemployment, simply because the dependent variable used in the French analysis does not, in contrast to the Blanchard and Diamond analysis, take into account job to job and out of the labour force to employment flows.

This line of reasoning could also go some way to explaining the differences in the variation in the unemployment effect across countries. The somewhat higher value found in Spain is likely to be reflective of the regulations regarding the registration of *colocaciones*. More specifically, the fact that in order for a *contrato* to be considered a *colocacion* both the vacancy and the person filling the position have to have been both previously registered at *INEM*, is likely to result in a larger unemployment impact than one might find in labour markets in which such pre-registration is not required. The relatively low

[8] In the case of France, a similar magnitude is however reported by Burda and Wyplosz in their study of outflows from French unemployment.

unemployment effect found in Great Britain on the other hand, could be reflective of the fact that non-unemployed job searchers have over our sample period been more successful in the competition for jobs than their unemployed counter-parts. Such an explanation does however, tend to draw into question the validity of the assumption implicit in the standard specification that the unemployment stock represents an appropriate proxy for the pool of available job seekers in the UK.

Focusing on the factors argued in the literature to affect the overall efficiency of the matching technology, we find that whilst increases in the level of mismatch and unemployment benefits/replacement ratios have the expected adverse effect on the long run efficiency of the matching technology, the impact of these factors varies quite considerably across countries. Increases in the level of regional mismatch result in a much lower number of matches for a given level of unemployment and vacancies in Spain than in the France or the UK, where the magnitude of these effects is found to be similar to that reported in a number of Beveridge curve studies. This "relatively" lower impact could however, be reflective of the fact that the degree of mismatch in both France and Great Britain has not changed significantly during the past twenty years. If anything, the relevant indices illustrate that the degree of regional and occupational mismatch has actually declined over this period. Moreover, the levels of regional mismatch in France would appear to be (and have been) much lower than those which prevail in other European countries. In addition, the particularly low level of inter-regional migration reported in Spain over our sample period would have undoubtedly exacerbated regional imbalances further, thus resulting in a larger mismatch effect

An attempt was also made to assess the impact of structural change in the labour market on the overall efficiency of the matching process, since adjustments to structural shifts in the economy can be expected to have a considerable impact on the overall matching process with displaced workers finding themselves unable to effectively compete with other job seekers for employment in new and expanding sectors. In an attempt to capture these effects, we experimented with a number of structural indicators previously used in the modelling of unemployment flows (see for example, Junaker and Price (1984) and Nickell (1982)). More specifically, we examine the impact of the expansion (contraction) of service (industrial) sector employment on matching efficiency, by including in our original specification the proportion of total employment in industry and services. The idea being that decreases (increases) in the ratio of industrial (services) employment can be expected to have a negative impact on overall matching due to the resulting emergence of a skill mismatch. Although these variables were signed in accordance with a priori expectations, it is only in the Spanish case that we obtain any significant impact. The results once again highlighting the structural component of Spanish unemployment, in that a 1% reduction in the proportion of employment in industry results in the long run in a 1.93% decrease in the number of new

hires. It should be noted however, that the magnitude of this coefficient and its associated standard errors, implies that it is not very well determined.

The results obtained also indicate considerable variation in the unemployment benefit effect (be it changes in the replacement ratio or in the average level of benefits paid) on the long run efficiency of the matching function. The largest impact occurring in Spain, a country recognised as having, despite recent reforms to tighten the eligibility/generosity of the system, a relatively more generous benefit system than Britain or France[9]. It is interesting to note also that whilst correctly signed in terms of *a priori* expectations, we fail to obtain any significant long run effect from a number of factors, such as the proportion of the unemployed classified as being: long term; with less than secondary education; without previous work experience; or household heads. Factors which have been argued in the literature (and have subsequently become the focus of labour market policy) to have had a considerable adverse impact on the degree of effectiveness/search intensity of the unemployed in Europe. In the French and Spanish estimations we do however find some evidence to support the argument that the increases in youth unemployment which have occurred in both of these countries may have had a considerable adverse effect on the efficiency of overall matching. Such an adverse impact may seem somewhat counter-intuitive in that one would expect, and one does indeed often find, that increases in the proportion of youths tends to have a positive, albeit small, effect on unemployment outflow estimations (reflecting the fact that this group tends to have a relatively high search intensity). It has to be remembered however, that in both France and Spain, (but particularly in the latter) this is the group of individuals which has found itself increasingly shut out of the labour market over our sample period.

In contrast to the findings of empirical work seeking to explain the outward shift in the Beveridge Curve which has occurred over the past two decades (see for example, Budd, Levine and Smith (1989)), changes in the proportion of long term unemployment are not found to have a significant impact on matching efficiency. It is important to note however, that it is somewhat difficult to directly assess the impact of changes in the proportion of long term unemployment on the hiring function, since the perception of a reduction in the quality of the unemployed, which may occur in the aftermath of significant increases in the numbers of long term unemployed, could also result in less vacancies coming on to the market (see Pissarides (1990)). It could however, be that disenfranchisement from the labour force does not, as implied by the traditional definition of long term unemployment, occur after being unemployed for one year, but at higher unemployment durations. In order to test this hypotheses we redefine the long term unemployed as

[9] Spanish earnings related benefits typically have a replacement ratios of 70% ( falling to 60% after six months), with a duration of 24 months.

those individuals with more than two years unemployment duration and re-estimate our original specification for France (the only country for which the relevant data is available throughout the entire sample period). Once again however, although the coefficient is correctly signed in terms of *a priori* expectations, it is insignificant. A significant effect is only obtained when we define long term unemployment as being the proportion of males unemployed for more than two years[10]. In this case not only do the French "very" long term unemployed fail to positively participate in the competition for jobs, but increases in their numbers as a proportion of the unemployment stock actually make it worse for all other unemployed job seekers. In that French employers would appear to equate an increase in the proportion of very long term male unemployment with a reduction in the overall quality of the pool of available job seekers for a given level of unemployment and vacancies. Matching consequently becomes less efficient as problems of sorting and signal extraction emerge, at a macroeconomic level this sequence of events would offer one explanation for the shift in the Beveridge Curve which occurred in France from the mid-1970's. In contrast to the findings of Blanchard and Diamond (1989) then, the French unemployed do not appear to enter the matching function in the homogenous manner implicit in the standard specification. Simply assuming that the stock of unemployment is an appropriate proxy for the number of job searchers is arguably a misjudgement, which could result in potential problems of mispecification bias for the existing European work in this area.

Perhaps not surprisingly, given the nature of our dependent variable only the 1986 and 1989 changes in employment legislation are found to have had a significant impact on the French aggregate matching function. The relaxation of the firing constraint in 1986 having a positive effect on the matching process and the 1989 tightening of controls over the use of temporary contracts and the regulations for dismissals having the expected adverse impact. In common with the Junakar and Price (1984) study on the determinants of unemployment outflows in Great Britain, only the 1975 Unfair Dismissal Act and the 1980 Employment Acts are found to have any long run effect on the estimated function. These results implying that the introduction of more stringent labour market regulations regarding a firm's ability to fire workers, which in turn makes employment adjustment more costly, has a negative impact on the matching process. Further support for the adverse effects of an over-regulated labour market is provided by the Spanish analysis, which again illustrates that the loosening of restrictive employment legislation results in the long

[10] This result could be explained by the fact that a large percentage of the long term unemployed in France are actually women, who, although they have no intention of participating in the labour market, are able to sign on in order to gain access to benefits. Increases in the numbers of long term unemployed may not therefore, necessarily be equated with a decline in the effectiveness of the unemployment stock as a whole, if these increases simply reflect, as has been the case during the 1980's, a larger number of women signing on the register.

run, in a significantly higher number of new hires for a given level of unemployment and vacancies. Attempts to proxy changes in the restrictiveness of employment legislation by including either the proportion of labour disputes found in favour of the employee or the total number of unfair dismissals cases brought before the relevant tribunals and conciliation boards in our specification were however, unsuccessful. In that whilst correctly signed, they were not found to be significant. Somewhat surprisingly however, both the 1984 and 1994 legislative changes appear to have had a similar impact on the matching process. One would have instead expected the 1984 loosening of employment regulations to have had considerable more of an impact on matching efficiency than the 1994 changes to the *colocaciones* registration system, which after all primarily affected the timing of registration. There are however, two possible explanations for this result. The first being that the 1984 legislation was introduced alongside a series of amendments to the unemployment benefit system (discussed in more details in the following section), changes which one would have expected to have had a negative impact on the matching technology via a reduction in the level of search intensity of the unemployed. Similarly, the 1994 administrative changes to the regulation of *colocaciones* were introduced at the same time as a number of important labour market reforms likely to have a positive impact the efficiency of the matching process. These reforms involved. a) amendments to the employment protection legislation regarding collective dismissals and the relaxation of the *ordenanzas laborales* in order to increase the firm's ability to allocate labour efficiency; and b) financial incentives for a number of specific types of employment contracts, such as the new youth employment contract (*contrato de apendizaje*). It is reasonable to assume, that the impact of the introduction of these reforms is also being captured by the 1994 dummy.

*A priori* it may seem somewhat surprising, especially given the fairly large impact deregulation appears to have had on the French and Spanish function, that we fail to find a significant impact on the British matching function from the relaxation of firing regulations in 1982. There are two likely explanations for this somewhat counter-intuitive result. The first is one of timing: the British deregulation took place at a time when Great Britain and the rest of Europe were experiencing a period of depressed demand and tight monetary policy. It seems reasonable to expect that in such a climate these changes would not necessarily have the immediate expected impact on the hiring function. Moreover, the increases in the level of uncertainty with respect to the nature of prevailing economic conditions, which occurred at this time, are likely to have outweighed/offset any positive impact of changes in legislation on a firm's willingness to hire and fire. Secondly, and perhaps more importantly, it has to be remembered that French and Spanish deregulation not only took place during a period of much more favourable demand conditions, but against a background of a much tighter regulated labour market. It may not be so surprising then, that these changes

were found to have more of an impact than in an economy such as Great Britain which, in European terms, was already more akin to the US system.

**3 Labour Market Policies and the Efficiency of the Aggregate Matching Function:**

In this final section we use the aggregate matching function framework to examine whether: a) the changes in the unemployment benefit system; and b) the labour market policies adopted by the respective Governments over the past fifteen years have, as intended, increased the general efficiency of the matching process. This approach would seem particularly suited to an assessment of the effectiveness of such policies, given that their objective was, and still is, to increase the effectiveness and thus the employability of the unemployed and therefore ultimately to raise the overall efficiency of the matching process.

Manpower training schemes have since the 1970's been repeatedly used by Governments in an attempt to curb the growing unemployment problem. One would have expected a number of these programmes, in particular those aimed at individuals classified as being 'difficult to employ' - namely the young and the long term unemployed, to have had an indirect impact on the hiring process. In that participation should in principle have resulted in an increase in the overall effectiveness of the unemployed, thereby raising the quality of the pool[11]. Changes in the unemployment benefit regime on the other hand, can be expected to have important ramifications for the efficiency of the aggregate matching function via their impact on the level of search intensity of the unemployed. Although the extent to which changes in the level of the minimum wage can be argued to form an integral part of active labour market policy is somewhat debatable, we also examine, given the central role it has played in the European unemployment debate, the impact of changes in the minimum wage on the efficiency of the aggregate matching process.

In an attempt to isolate the impact of changes in these policies on the overall efficiency of the matching function we include in our previous specification: a) dummy variables to cover the periods in specific active labour market programmes operated; and b) in the French and Spanish analysis, the number of training contracts registered at the national employment office in the previous quarter as a proxy for the proportion of individuals involved in labour market programs. To examine the impact of changes in the unemployment benefit system the relevant dummy variables are again included, together with a measure of benefit coverage. The idea here being that changes in the overall degree of "generosity" of the employment protection system, in terms of leniency of eligibility conditions and length of time benefits are paid, will to

[11] A more in-depth discussion of the labour market policies for France and Great Britain can be found respectively in Cornilleau (1989) and Disney et al. (1992).

some extent be captured by changes in the degree of coverage. In the empirical analysis we experiment with two types of coverage indicators: the first assesses the impact of changes in the proportion of the unemployed receiving insurance related unemployment benefit; the second looks at the coverage issue from a wider perspective, to examine the impact of changes in the proportion of the unemployed receiving any kind of unemployment benefit related payment, in other words insurance or assistance benefits.

**Table 2:**

The Impact of Active Labour Market Policies on the Efficiency of the Matching Process:
(t-statistics in parenthesis)

| Variables | France | | Great Britain | | Spain | |
|---|---|---|---|---|---|---|
| unemployment | 0.48 | (1.89) | 0.19 | (2.12) | 0.80 | (1.78) |
| vacancies | 0.11 | (1.97) | 0.44 | (3.03) | 0.31 | (1.76) |
| benefit effect | -0.31 | (-2.71) | -0.64 | (-1.52) | -1.00 | (-2.25) |
| prop U who are youths | 0.53 | (2.37) | | | 4.5 | (-3.47) |
| regional mismatch | -0.06 | (-3.69) | -0.09 | (-1.91) | -0.70 | (-1.45) |
| structural change | | | | | 4.57 | (1.77) |
| proportion U female | 1.30 | (2.24) | | | | |
| proportion U long term | -0.18 | (-2.13) | | | | |
| **Legislation** | | | | | | |
| France 1986 | 0.09 | (2.75) | | | | |
| France 1989 | -0.15 | (-2.81) | | | | |
| Spain 1984 | | | | | 0.02 | (0.15) |
| Spain 1994 | | | | | 0.31 | (1.60) |
| Great Britain 1975 | | | -0.38 | (-4.00) | | |
| Great Britain 1980 | | | -0.22 | (-3.31) | | |
| Minimum Wage | -0.25 | (-0.45) | | | -1.32 | (-1.92) |
| No. of new training contracts | 0.06 | (1.68) | | | 0.24 | (1.25) |
| ALMP Great Britain 75-78 | | | 0.04 | (1.02) | | |
| ALMP Great Britain 82-86 | | | -0.04 | (-0.67) | | |
| Change to Benefit system | 0.06 | (2.00) | | | 0.13 | (0.93) |
| **Diagnostics** | | | | | | |
| R Bar $^2$ | 0.84 | | 0.85 | | 0.46 | |
| LM Correlation | F(4,35)=1.22 | | F(4,45)=1.5697 | | F(4,43)=0.193 | |
| Ramsey Reset Test | F(1,38)=1.1044 | | F(1,48)=2.4712 | | F(1,42)=1.73 | |
| Normality | $Chi^2$(2)=0.60962 | | $Chi^2$(2)=0.10064 | | $Chi^2$(2)=2.91 | |
| Heteroskedasticity | F(1,57)=0.35403 | | F(1,69)=0.048939 | | F(1,58)=0.055 | |
| Stability Test | F(20,20)=2.16 | | F(17,34)= | | F(21,24)=1.30 | |
| Number of observations | 59 | | 71 | | 60 | |

The French policy response to the escalating unemployment problem in terms of active labour market measures has resulted throughout 1980's in a continual switching of focus from one targeted group to another. Such a stance has culminated in a myriad of polices which makes it somewhat difficult to pin-point the relevant polices to be included in our analysis. The most effective, in terms of attainment of their

original objectives and magnitude of coverage, would appear to be: the early retirement programmes introduced in 1985 by the Mitterand government; the job creation schemes introduced during the latter half of the 1980's and the early 1990's aimed primarily at youth and the long term unemployed (*Contrat de retour à l'emploi (CRE)* and *Contrat emploi-solidarité (CES)*). In 1992 France also introduced a much needed and long overdue overhaul of the unemployment benefit system. The most relevant changes, in terms of their possible impact on matching efficiency, being that: a) the level of benefits paid are now determined by both the individual's previous salary and his period of contribution to the system; and b) unemployment benefits are progressively reduced every four months.

As is evident from the results in table two, column one, although correctly signed we fail to obtain the expected significant adverse effect from the increases in the real value of the French minimum wage (*SMIC*), which occurred during the early 1980's. Whilst this may be somewhat surprising, in that one would expect increases in the *SMIC* to have the same effect as the introduction of more restrictive labour market policies, it may be the case that the impact of these changes is, as with the impact of increases in other labour costs, reflected in the vacancy data itself. The 1992 regime switch to a more "stringent" benefit system would on the other hand, appear to have gone some way towards fulfilling its objectives, in that it has had a positive long run impact on matching efficiency. The relatively small impact obtained is not however, that surprising, given the nature of these changes. For, benefits in France are still comparatively generous: initial replacement ratios remain high and benefit duration is still considerably longer than most other European countries. Perhaps not surprisingly, given the inconsistency of French labour market policy, attempts to focus on the impact of individual labour market policies proved to be unsuccessful, in that none of the dummy variables introduced to isolate the impact of individual programmes were significant. Increases in the number of training (*stage*) and apprenticeship contracts, the main objective of which being to increase the effectiveness of those job seekers under 25 years of age, are however, found to have a positive long run impact on the overall efficiency of the matching process.

The active labour market programmes considered most likely to have an impact on the matching process in Great Britain during our sample period are: a) the job creation schemes which operated from 1975 to 1978; and b) the Community Programme which operated over the period 1982 to 1986 in an attempt to increase the general level of effectiveness of the unemployed, and in particular the long term unemployed[12]. From the results of column two, it would appear that the British Government's policies fail to have had the expected significant impact on the long run characteristics of the matching function. The

[12] The Community Programme was one of the largest employment measures targeted at adults in Great Britain, particular focus being the long term unemployed, all of whom were offered placements of one year's duration on programme.

only programme which appears to have had any long term impact, and even then it is barely significant, is the direct job subsidy scheme, which operated in the manufacturing sector. These results in themselves cannot however, simply be taken as support for the argument that job subsidies have in the past worked better than training schemes, since a more plausible explanation for the apparent lack of impact of training polices on the hiring process is provided by the work of Turner (1985), whose research illustrates that approximately 65% of those individuals who left the Community Programme actually re-entered unemployment. What is perhaps more relevant to our insignificant result is the fact that: a) the scheme was voluntary. It may have been more effective if registration was compulsory, although given the nature of the work undertaken, this is somewhat debatable, and b) the Community Programme cannot really be perceived as a way of increasing skills, since most of the people on the scheme worked part-time on jobs, which although deemed to be of practical importance to the Community, did not really address the problems we associate with long term unemployment, such as worker condition discipline and skill deterioration. In contrast, one Government policy claimed to have been very effective in this respect is the Restart Program aimed specifically at improving the efficiency of job search, by providing advice and free facilities for applying for positions etc.. Studies of unemployment outflows (see for example, Disney (1992) illustrate that this policy appears to have had a tremendous impact on outflow from unemployment for long term unemployed. One would have expected it therefore, to have had a significant impact on the overall matching process. Unfortunately, as with the changes made to the British unemployment benefit system introduced in 1986, it was not in operation during our sample period.

Throughout the 1980's Spain has made numerous amendments to the regulations concerning training related contracts (*Contratos de Formaciòn*), originally introduced at the end of the 1970's, which have largely affected eligibility and the duration structure of such contracts. At the outset we attempted to isolate the impact of each of these changes by including the appropriate dummy variables for the individual changes in legislation. Not surprisingly, given the nature and frequency of these changes, our attempts were unsuccessful. In an attempt to side-step these problems, we therefore included in our specification the total number of these contracts registered each quarter at *INEM* as a proxy for the extent of labour market programmes. We also allow for a dummy variable to capture the impact of the comprehensive set of labour market reforms to promote employment announced by the government in December 1993. A particularly interesting feature of which being the introduction of the *Contratos de apendizaje*, which in an attempt to ease the school-to-work transition considerably reduced the costs to firms of employing those aged between

16-24 without post-secondary or higher education[13]. Over the past 15 years Spain has also "tinkered" with the unemployment benefit system on numerous occasions: in 1984 *Ley 31/84* extended coverage of the groups eligible for unemployment benefit and increased the average amount of benefits received; in 1989 the maximum duration of benefits was increased by 6 months for all those classified as long term unemployed and those over the age of 45. In addition, further extensions to coverage occurred, with a reduction in the minimum age entitling someone to indefinite unemployment benefit. This trend of increasing generosity was, in line with other European countries, reversed somewhat in 1992 *(Ley 22/1992)*, with the introduction of tighter eligibility conditions and a reduction in both the duration of benefit entitlement and the level of replacement ratios. Again we attempt to capture these effects by including a measure of benefit coverage, as a proxy for changes in the degree of generosity, together with a dummy variable to account the regime switch in 1992.

Regardless of whether we use coverage or shift dummy variables, we fail to find a significant effect from the minor changes to the benefit system which occurred throughout the 1980's. Furthermore, the dummy variable included to account for the move to a more stringent regime at the end of 1992, although correctly signed in terms of *a priori* expectations, is also found to be insignificant. One explanation for this lack of significance could be that although the reductions in replacement ratios and the minor reforms to benefit duration undoubtedly lowered the financial cost of the system, such changes are not likely to have much of an impact on the effectiveness of the unemployed (and in particular on the long term unemployed), given that a large part of unemployment in Spain is concentrated on the young and women, groups who the data suggests do not have the necessary work experience to be entitled to unemployment benefit.

Active labour market policy in Spain, in terms of the provision of job related training schemes would on the other hand appear to have been somewhat more successful, despite a significant amount of criticism as to the quality and focus of training programs. The results obtained indicate that increases in the number of training contracts has a positive impact on the number of new hires, for a given level of unemployment and vacancies. The effectiveness of this scheme is reflected in the fact that the number of contracts registered at *INEM* increased from 110,000 to 260,000 in 1994. The appropriateness of the use of the number of training contracts as a measure of the extent/effectiveness of active labour market policy is however, open to the criticism that these forms of contracts cannot really be used as an indicator of the effectiveness of active labour market policy, since individuals who do not satisfy the eligibility criteria are

[13] Under such contracts employers: a) pay a wage of 70, 80 and 90% of the legal minimum wage during the first, second and third year of employment; and b) do not pay contributions to the unemployment system during the course of the contract. In return the law stipulates that 15% of the apprentice's work time is to be spent in theoretical training.

more often than not employed under such contracts to enable firms to take advantage of the tax or social security contributions allowances. It has to be remembered however, that even if the system is abused by potential employers and thus incurs a dead-weight loss, its very existence can still indirectly facilitate the overall efficiency of matching.

Finally, it is interesting to note, that in contrast to the French results increases in the real value of the Spanish minimum wage are found to have the expected adverse effect on matching efficiency.

**4 Concluding Remarks:**

Two issues emerge from this initial empirical work. Firstly, in contrast to existing work in this area, whilst our results support the existence of an aggregate matching function in all three labour markets, we do not find overwhelming evidence for what has become the somewhat standard assumption in theoretical research of a constant returns to scale matching technology. The matching technology would instead appear to exhibit increasing returns in both Great Britain and Spain and decreasing in France. Secondly, and perhaps more importantly, given the ramifications for both empirical and theoretical research in this area, a number of our results draw into question the appropriateness of the standard specification within a European context. For example, the fact that: a) changes in the proportion of very long term unemployed have a significant adverse impact on the French matching function; and b) we find a relatively small coefficient on British unemployment would tend to draw into question the validity of the assumption that the stock of unemployed is an appropriate proxy for the available pool of workers. Further research into finding an appropriate specification for the matching function, a function which plays a fundamental role in the flows literature, would therefore appear to be warranted.

One interesting implication of our results is that whilst the evidence presented offers support for the adverse effect of factors such as mismatch, unemployment benefit and other structural issues often cited in the literature as introducing frictions into the matching process, changes in labour market regulation *per se* do not have the immediate impact on the hiring process that one might have expected. One interpretation of this result that deregulation appears to have had the expected effects in France and Spain, but not in the UK could be that it is not only labour market regulation *per se*, but the nature of the prevailing economic conditions under which these changes take place, which is relevant in determining the impact that such changes have on the hiring process (see Bell (1996)). It is however, important to remember, when interpreting these results, that it is difficult to disentangle the effects of employment protection on a firm's willingness to hire and its decision whether or not to open a vacancy.

In the final section of the paper we extend our analysis somewhat further in order to use the matching function framework to assess the impact of a number of active labour market policies introduced during the past 15 year on the efficiency of the matching process. The results obtained are somewhat mixed. Although active labour market policy *per se*, as reflected in the British results, does not appear to have had much of any impact on the efficiency of labour market matching, work related training schemes and reductions in the Spanish minimum wage paid to youths do appear to have had a significant positive impact on the matching process. What would appear to be important to the success of these schemes, as measured by their impact on the matching process, is the very nature of the programmes themselves, in terms of what the policy involves, who it is targeting and how it is provided. More specifically, when policies are aimed at specific groups know to be at a disadvantage in the job market, they appear to be more effective. In stark contrast the general provision regardless of quality, of job training or work experience which has tended to characterise the British labour market programmes of the late 1970's and early 1980's would not appear to have little impact on the overall efficiency of the matching process.

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**Table A.1:**

Sample Summary Statistics

| | France | | Great Britain | | Spain | |
|---|---|---|---|---|---|---|
| | Mean | Std. Dev | Mean | Std. Dev | Mean | Std. Dev |
| **Main Variables** | | | | | | |
| New Hires | 6.048 | 0.12424 | 7.5991 | 0.2185 | 6.6672 | 0.48607 |
| Unemployment | 7.75 | 0.25382 | 7.0491 | 0.67026 | 7.7401 | 0.22600 |
| Vacancies | 4.1293 | 0.26534 | 5.0927 | 0.33415 | 4.3368 | 0.63359 |
| **Variables affecting Search and Mismatch** | | | | | | |
| regional mismatch | -3.8433 | 0.59972 | 4.3253 | 0.48902 | -3.3199 | 0.14939 |
| structural change | | | | | 3.1751 | 0.06927 |
| proportion of long term U | -2.1885 | 0.31617 | -1.4910 | 0.34126 | | |
| replacement ratio | 1.1083 | 0.32934 | 0.4089 | 0.02099 | 0.43982 | 0.24403 |
| Minimum wage | 1.6197 | 0.06663 | | | -0.57557 | 0.06040 |
| proportion of under 25 | -1.1431 | 0.26126 | | | -0.81210 | 0.17267 |
| proportion female | -0.66954 | 0.04251 | | | | |

## DATA APPENDIX:

**Principal Variables:**

British new hires: unpublished data on the total number of engagements in the economy, based on P45 returns. Manpower Services Commission.

French new hires: constructed from unemployment outflows disaggregated according to destination series published in *Bulletin Mensuel des Statistiques du Travail du Ministère du Travail*. More specifically, new hires are calculated as the number of individuals leaving the unemployment register to take up permanent employment.

Spanish new hires: total number of *colocaciones* registered each quarter at the *Instituto Nacional de Empleo, Estadisticas de Empleo, Instituto Nacional de Empleo.*

British unemployment: unpublished historic series of the stock of registered unemployment, Department of Employment.

French unemployment: monthly registered stock of unemployment, *Bulletin Mensuel des Statistiques du Travail du Ministère du Travail.*

Spanish unemployment: monthly registered stock of unemployment, *Estadisticas de Empleo, Instituto Nacional de Empleo.*

British vacancies: unfilled vacancies series registered at the end of the month with local employment centres taken from various issues of the Department of Employment Gazette. This series was then adjusted to take account of vacancies not registered with employment centres according to the method proposed by Jackman, Layard and Pissarides (1989).

French vacancies: unfilled vacancies registered at the *ANPE* at the end of each month, *Bulletin Mensuel des Statistiques du Travail du Ministère du Travail.*

Spanish vacancies: unfilled vacancies registered at *INEM* at the end of each month, published in *Estadisticas de Empleo, Instituto Nacional de Empleo.* This series was then adjusted according to the methodology of Antolin (1994).

**Mismatch and Search Intensity Variables:**

British benefit effect: replacement ratio calculated on the basis of the unemployment benefit rate for a married man, with two children, excluding earnings related supplement, Abstract of Statistics, Department of Health and Social Security.

The French and Spanish benefit effect is the ratio of average benefits paid to average earnings, where average benefits were calculated as the ratio of monthly unemployment benefits paid per person entitled to them. Data on the amount of benefits paid each month, together with the number of people entitled to benefits was taken for: France, from *Bulletin Mensuel des Statistiques du Travail du Ministère du Travail*; and for Spain, from the *Estadisticas de Empleo, Instituto Nacional de Empleo.* The French data on average earnings was obtained from INSEE, the Spanish from various issues of the *Boletín Estadístico del Banco de España*.

The minimum wage series for France is taken from the *Bulletin Mensuel des Statistiques du Travail du Ministère du Travail.* The Spanish series is taken from various issues of the *Boletín Estadístico del Banco de España*.

Regional mismatch index, following Jackman and Roper (1986) is defined as being equal to $1/2\sum_i\left(V_i/V \cdot U_i/U\right)$, where the subscript $i$ denotes the regional unemployment and vacancy rates. The regional unemployment and vacancies data were obtained from the sources quoted in the previous sub-section for the aggregate variables, and where applicable adjusted on the same basis outlined in the text.

Structural change index defined as $\frac{1}{2}\sum\left|\Delta\left(\frac{N_i}{N}\right)\right|$, where *Ni* denotes employment in sector *i*. More specifically, sector *i*, represents agriculture, industry, construction and services and *N*, total aggregate employment. Data on employment in agricultural, construction, industry and services in: Great Britain is taken from the Department of Employment Gazette; Spain from the Labour Force Survey *(Encuesta de la Poblacion Activa, INE)*; and France from the OECD Quarterly Labour Force Statistics.

The number of training contracts for France is defined as the total number of apprenticeship and *stage* contracts (the only training related contracts for which a historical period was available over the whole of our sample) registered at the *ANPE* each month. Both of these series are published in the *Bulletin Mensuel des Statistiques du Travail*. Due to the unavailability of more disaggregated data throughout the whole of the sample period, the Spanish series refers to the total number of training related contracts (*contratos de formacion*) registered at *INEM* each month. This series is published in the *Estadisticas de Empleo, Instituto Nacional de Empleo*.

Unemployment data disaggregated according to: age; duration; and previous labour force experience are: for Great Britain taken from various issues of the Department of Employment Gazette; for France, from the *Bulletin Mensuel des Statistiques du Travail du Ministère du Travail*; and for Spain from the *Encuesta de la Poblacion Activa, INE*.

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