UNEMPLOYMENT FLOWS AND VACANCIES IN SPAIN*

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ABSTRACT

In this paper we present a study into the Spanish unemployment problem. To do so we examine unemployment flows, the relationship between unemployment and vacancies, and the outflow rate from unemployment. We propose a way of correcting the administrative, official, vacancy data. The unemployment problem appears to lie in the probability of leaving the unemployment pool, proxied by the outflow rate from unemployment. The outward shift in the u-v curve can be explained by the increase in the share of long term unemployment. And, finally, we also investigate the problem of search externalities and the scope for multiple equilibria.

KEYWORDS: Vacancies, Unemployment Models, Job Search, Time Series Analysis.

RESUMEN

En este documento se estudia el problema del desempleo en España. Para ello se examinan las fluctuaciones de desempleo, la relación entre desempleo y vacantes, y la tasa de salida del desempleo. Se propone un método para corregir la información oficial de la administración púbica sobre vacantes. El problema del desempleo parece residir en la probabilidad de dejar el colectivo de desempleo, estimada a través de la tasa de salida del desempleo. El desplazamiento hacia fuera en la curva U-V puede explicarse por el aumento en la participación en el desempleo de largo plazo. Finalmente, se investiga también el problema de las externalidades en la búsqueda y la probabilidad de equilibrio múltiple.

PALABRAS CLAVE: Vacantes, Modelos de Desempleo, Búsqueda de Empleo, Análisis de Series Temporales.

I. Introduction.

Unemployment has become the most acute problem in the recent evolution of the labour markets in the EC and in Spain in particular. Substantial research has been conducted as to the causes of the sharp rise in Spanish unemployment, its persistence at high levels, and the negative duration composition of unemployment, that is, the high proportion of long term unemployment[1] (Dolado et al. (1986), Andres et al. (1990), Bentolila and Blanchard (1990), and De Lamo and Dolado (1991)). All these studies use a stock analysis of unemployment, but it is important to analyse the flows into and out of unemployment, since changes in the stock of unemployment comprise the difference between both flows. A stock analysis of unemployment ignores the information embodied in the level of flows, while a flow approach is likely to be more informative because it involves both sources of information, that which is embodied in the difference between the flows, and that which is embodied in the levels.

The labour market is characterised by the existence of flows into and out of the unemployment pool, together with the existence of job openings and unfilled vacancies at any moment of time. In the functioning of the labour market there is a process of matching of workers and jobs. An examination of the joint movement of unemployment and vacancies, therefore, can provide a great deal of information about the functioning of the labour market in general, and in particular, about the unemployment problem.

In this paper we examine the evolution of unemployment flows and the relationship between unemployment and vacancies. The paper is organised as follows: Section Two first describes the evolution of unemployment flows in Spain, then examines the vacancy data and proposes a way of correcting the raw data, and, finally, reports the empirical u–v curve in Spain. We can conclude that the reasons behind the sharp rise in unemployment and its

[1] Throughout the paper we refer to these problems as the Spanish unemployment problem.

persistence at high levels lie in the evolution of the flows out of unemployment as compared to the flows into unemployment. The reason for this is that there is a big gap between the flows into unemployment and the flows out of unemployment between 1977 and 1985, the latter being lower than the former. This gap is due to the fact that the flows out of unemployment failed to keep track of the inflows, as it did prior to 1977. Since 1986 both flows have returned to the pre–1977 pattern, that is, outflows following inflows with a lag of about one year.

Section Three describes the theoretical relationship between unemployment and vacancies, and the theory underlying the matching process. In Section Four, we present an econometric analysis of the relationship between unemployment and vacancies, in which we, first, examine the relationship between the duration of unemployment and the duration of vacancies. Second, we estimate the u–v locus and we then examine the possible factors behind the shift of the u–v curve. We use both the official vacancy data and our corrected vacancy series, and we present estimations of the correction factor proposed. And, finally in Section Four, we focus on the outflow rate to examine the problem of search externalities and the scope for multiple equilibria. Section Five concludes with the main results.

II. Unemployment Flows and Vacancies in Spain.

In this section we stress the importance of studying the flows out of unemployment to understand the unemployment problem. We also show the relevance of examining the relationship between unemployment and vacancies. The raw vacancy data are analyzed and a correction factor is proposed, given the features of the data at hand. Finally, we briefly introduce the main changes in the Spanish employment legislation.

The stock of unemployment is comprised by the flows into and out of unemployment. The change in the stock of unemployment (ΔU) is equal to the difference between the flows into unemployment (S) and the flows out of unemployment (H). We can express this relationship in terms of unemployment rates and flow rates:

$$\Delta U = S - H$$

$$\Delta(U/U+N)=(S/U+N)-(H/U+N)=(S/N)*(N/U+N)-(H/U)*(U/U+N)$$

That is, the change in the unemployment rate is equal to the inflow rate, times the employment rate, less the outflow rate times the unemployment rate. In steady state S=H and unemployment is constant, we then have that in steady state:

$$\text{unemployment rate} = \frac{1}{1+\dfrac{\text{outflow rate}}{\text{inflow rate}}} = \frac{s}{s+h} \qquad (1)$$

The unemployment rate comprises the inflow and outflow rates, so in order to have a better understanding of the unemployment problem it is important to study both flows. In appendix A, we report the series of both flows and the one of unemployment. We also present some figures showing the time path of these variables.

In Figure 1 we report the flows out of and into unemployment. Figures 2 and 3 present the inflow and outflow rates. Both flows fell between 1964 and 1977, with outflows lagging one year behind inflows. This pattern was broken in the period from 1977 to 1985, with inflows and outflows evolving separately. Inflows initially tended to rise and then remained stable. However, outflows initially fell to remain stable at a lower level than inflows. Since 1986, both flows have tended once again to evolve together. We can then conclude that the further fall in flows out of unemployment and its inability to track the inflows, explains the rise in unemployment through the period between 1977 and 1985. Since 1986 both flows have moved together and at the same level again, with the outflows being slightly higher than the inflows. The latter is consistent with the small decrease in unemployment since 1986 and its tendency to remain at high levels (see Figure 4).

Therefore, we need to understand the flows out of unemployment and their recent evolution in order to explain the sharp rise in the unemployment rate, its persistence at high levels, and the duration of unemployment. The unemployment problem may be appreciated by looking at Figures 4 and 5. In Figure 4 we present the unemployment rate, which reaches a peak in 1985, while Figure 5 shows the time series of long term unemployment in Spain, which grows all through the period and reaches its peak around 1987–88.

The flows out of unemployment make it possible to establish a relationship between unemployment and the job search behavior of the unemployed, the vacancies advertised by firms, the duration composition of the unemployment pool, the mobility of the labour force, and the persistence of unemployment. The inflow rate is a proxy for the probability of entry into the unemployment pool, while the outflow rate is a proxy for the probability of leaving the unemployment pool. The latter comprises the likelihood of receiving a job offer and the likelihood of accepting the job offer. The likelihood of receiving a job offer will increase when there are more available jobs in the economy. Therefore, the more job vacancies there are, the more likely it is that the unemployment outflows will rise, which will tend to reduce unemployment. We then have a relationship between unemployment and vacancies, where the flow out of unemployment is the link between them.

We therefore need to examine the evolution of job vacancies in the economy. Our concept of vacancy stems from the Spanish Public Employment Service (INEM). Job vacancies are firms' job offers (without naming the worker), registered at the employment offices, available immediately, and still vacant at the end of the relevant period (one month). The problem is to know how close this administrative job vacancy data are to the total number of vacancies in the economy, which depends on the Public Employment Service's (PES) market share in the total stock of vacancies. Thus, to produce the corrected vacancy series, this share can be used as the correction factor, however, it is not accurately known. Jackman et al. (1989) assume that this share, for Britain, equals the share of the employment service in the flow of engagements and separations.

In the case of Spain, since 1980 employers have been required to notify job vacancies to the INEM by law and there are social security cost incentives to do so. That it is why there are two types of registered job offers, (i) named job offers, in which firms notify a vacancy together with the name of the worker who is going to take the vacancy up; and (ii) generic job offers, in which firms notify the vacancies and the employment service seeks suitable workers.

However, there exists a timing problem. The privately advertised job offers were vacancies at one point in time, but when these job offers are registered with the INEM, they are registered as named job offers because they come together with the worker who is going to fill them. Thus, they never became part of the vacancies which they actually were before being registered.

Therefore, we suggest the following way to obtain a corrected vacancy series for the case of Spain. The available data from the employment offices are the monthly official vacancies, the inflow of unnamed job offers, and the outflow (hirings plus dropouts) of unnamed job offers. They also provide the outflow (hirings) of named job offers. Named job offers are taken immediately, that is why the inflow and the outflow of named job offers are equal. We do not actually have the inflow of named job offers that occurs monthly, we just have the named job offers registered that have been taken at the same moment, irrespective of whether they were vacant or not before. We do not have either the stock of named or private vacancies.

The total stock of vacant jobs, V, is the sum of official vacancies, V^o, and privately advertised vacancies, V^p. That is:

$$V = V^o + V^p \tag{2}$$

The total outflow, OUT, is the sum of unnamed, OUT^u, and named, OUT^n, outflows. That is:

$$OUT = OUT^u + OUT^n$$

We examine the relationship between private and administrative vacancy data looking at the relationship between their durations. If we compute duration as stock over outflows, the duration of a vacancy in the INEM is given by V^o/OUT^u, and the duration of a vacancy in the private advertised route by V^p/OUT^n.

If we assume that the INEM is less efficient as a placement office than private advertising, the duration of a job post will be higher in the INEM than through private advertising. That is:

$$V^o/OUT^u > V^p/OUT^n \qquad \text{Hence,} \quad V^o/OUT^u = k^{-1}*(V^p/OUT^n) \tag{3}$$

where k measures the relative efficiency of private advertising as a placement system. For values of k<1, private advertising is more efficient.

From equation (3) we get the following relationship between V^o and V^p:

$$V^p = [k \cdot \frac{OUT^n}{OUT^u}]V^o \tag{4}$$

Substituting (4) into (2) we have our key equation to correct the administrative vacancy data:

$$V = [1 + k \cdot \frac{OUT^n}{OUT^u}] V^o \tag{5}$$

It is important to distinguish between k and $[k.(OUT^n/OUT^u)]$. The former measures the relative efficiency of private advertising, in the sense that for $k<1$ the duration of a vacant job is higher through the public route than by private advertising. The latter measures the relative (numerical) importance of private advertised vacancies. If $[k.(OUT^n/OUT^u)]<1$, there are more public vacancies than private vacancies in the total vacancy series. It could be the case that $k<1$ but there would be more private vacancies because the named outflows are quite large with respect to the unnamed outflow.

The last OECD economic survey on Spain claims that only around 10% of job vacancies are filled directly by the INEM, with the remainder filled directly by firms. If this figure is accurate, this implies that of the total amount of job openings filled, 10% are through the INEM while 90% are through the private route. Hence, the ratio of named to unnamed outflows would be 9. If we assume that the private route is more efficient, this justifies taking low values of k. In our data set $1.9<OUT^n/OUT^u<7.5$. We will investigate the most likely value of k in Section Four by using different values of k in the estimation procedure.

Figure 6 shows the evolution of the Spanish stock of vacancies (1977–1991). We can see that it has grown since 1981, reaching a maximum around 1987–88, and thus paralleling the evolution of unemployment with around one lag (Figure 4). Figures 6b and 6c are the stock of vacancies, quarterly and monthly respectively. The Spanish vacancy rate is shown in Figure 7. The corrected vacancies series, for several values of k, show a higher vacancy rate since 1981.

The u–v curve is plotted in Figure 8. It shows a continuous outward shift since 1977 to 1984. Thereafter, it shows a loop. However, this loop is less marked when we use the corrected vacancies series. We will present an econometric study of the causes behind this shift in Section Four.

Figure 9 plots the unemployment–vacancy duration curve. The duration of unemployment has grown together with the duration of vacancies. First, there is a sharp rise in unemployment duration for given vacancy duration (1977–81). Second, we have a sharp rise in vacancy duration for a given unemployment duration (1981–83). Since 1986 both are stable at higher levels than in 1977.

During the last fifteen years (1977–91) there have been several important changes in the Spanish employment legislation, and especially, in the unemployment protection system. In 1984, Law 32/1984 and the AES ("Acuerdo Economico y Social": Economic and Social Agreement of Nov.84) increased the type of contracts available, with the aim of increasing the flexibility of the labour market and the capacity of the Spanish economy to create employment. Fixed term labour contracts, temporal contracts, formation and training contracts, and part–time contracts[2] were all introduced. Also implemented were incentives to hire workers (e.g., reductions in the employers' Social Security payments), especially from amongst the long term unemployed and the young.

The unemployment protection system has changed three times during this period. From 1980 to 1984 the Ley Basica del Empleo (LBE) was implemented, and it entailed a large reduction in the number of unemployed who were eligible for unemployment protection/benefits. However, Law 31/84 (LPD: Ley Proteccion por Desempleo), enforced from 1985 to 1988, entailed: (1) an extension of the different groups of unemployed eligible for protection; (2) an extension in the duration of unemployment benefits; and (3) a modification of the limits of the quantity to receive (more generous). From 1989, Law 3/1989 introduced an extension of six months more in unemployment protection for the

[2] For an economic analysis of the flexibility of contractual forms in Spain see Bentolila and Saint–Paul (1992), and Bentolila, Segura and Toharia (1991).

long term unemployed, especially for those who had family responsibilities, and especially for those older than 45. Those who had been unemployed for a very long time, more than two years, received a six month extension if they had family responsibilities and there was no age restrictions. The law also reduced the minimum age entitling someone to indefinite unemployment benefits from 55 to 52. In 1992 there was another change in the legislation, which made access to unemployment benefit harder and reduced the period of entitlement.

III. The Theoretical Framework.

In equation (1), we saw that u=s/(s+h), where s is the inflow rate and h the outflow rate. We concluded in the previous section that we need to study the outflow from unemployment to reach a better understanding of the unemployment problem in Spain. Furthermore, we stressed the importance of examining the unemployment–vacancy relationship and the need to explain the outward shift of the u–v curve. We will now present a theoretical framework to formalize the determinants of the outflow rate and the relationship between unemployment and vacancies. This framework draws on the job matching approach[3].

With respect to the inflow rate, it is assumed that the flow into unemployment results from job specific shocks[4] that affect occupied jobs at the rate s, the rate of job separations. Thus, job separations follow a Poisson process with rate s which is independent of the process that describes the filling of jobs (see below) and which is exogenous to the model.

At the same time as firms look for workers by advertising vacancies, unemployed and employed workers are actively engaged in searching for jobs. Only a fraction of all vacancies get filled per period. The job matching technology describes the process of matching vacant jobs and workers searching for jobs.

Denote by L the number of workers in the labour force, u the unemployment rate (the fraction of unmatched workers), and v the number of vacant jobs as a fraction of the labour force (vacancy rate). Only uL unemployed workers and vL job vacancies engage in

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[3] The model borrows from Pissarides (1990).

[4] Burgess (1992b) examines the implications of the endogeneity of the inflow rate in the case of the UK. When inflows are endogenized, new dynamics arise because the search and matching process, as the basis of the comovements of unemployment and vacancies, works through both the outflow and the inflow channels.

matching[5]. Thus, the number of job matchings per unit of time is given by the matching function:

$$xL=x(uL,vL) \tag{6}$$

The matching function is assumed to be increasing in both arguments, concave, and homogeneous of degree one. The last assumption implies constant returns to scale. In a growing economy it is the only assumption that ensures a constant unemployment rate along the balanced growth path.

Job vacancies and unemployed workers which are matched at any point in time are randomly selected from the sets vL and uL. Hence, we have two transitions. First, the process that changes the state of vacant jobs is Poisson with rate $x(uL,vL)/vL$. By the homogeneity of the matching function, this rate is only a function of the ratio v/u, denoted θ. Thus, the rate at which vacant jobs become filled (i.e., the engagement rate) is:

$$q(\theta)\equiv x(u/v,1) \tag{7}$$

During a small interval of time, δt, a vacant job is matched to an unemployed worker with probability $q(\theta)\delta t$, so the mean duration of a vacant job is $1/q(\theta)$. By the properties of the matching function $q'(\theta)\leq 0$ and the elasticity of $q(\theta)$ in absolute value is $0\leq\eta(\theta)\leq 1$. Second, unemployed workers move into employment according to a Poisson process with rate $x(uL,vL)/uL$. Using θ notation, this rate, the outflow rate, is $\theta q(\theta)$ and has elasticity $1-\eta(\theta)\geq 0$. The mean duration of unemployment is $1/\theta q(\theta)$.

The parameter θ is an appropriate measure of the tightness of the labour market. The dependence of the duration functions $q(\theta)$ and $\theta q(\theta)$ on the relative number of vacancies and unemployed people (tightness) is the cause of search externalities (i.e., the effect of actions by firms and workers on the transition probabilities of other firms and

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[5] Employed workers also engage in job searches. The analysis of on—the—job search is very important as well. See the papers by Burgess (1992a, 1993).

workers).

The outflow rate has been derived as $h=\theta q(\theta)$ and the inflow rate, s, was assumed to be exogenous. Hence, equation (1) becomes:

$$u = \frac{s}{s+\theta q(\theta)} \tag{8}$$

This equation is the key equation of the model. It implies that: (i) unemployment is determined in terms of the transition probabilities or rates; (ii) for given s and θ there is a unique equilibrium unemployment rate; (iii) s is a parameter of the model; and (iv) θ is unknown. The parameter θ is determined by an equilibrium derived from the assumption of profit maximization and it is unique and independent of u.

The equilibrium condition (8), when drawn in the u–v space, corresponds to the unemployment–vacancy, u–v or Beveridge curve. This curve shows the combinations of vacancies and unemployment where flows into unemployment equal flows out of unemployment. It is a downward–sloping stochastic equilibrium relation between vacancies and unemployment. The properties of the matching technology determine that the u–v curve slopes down and is convex to the origin. With more vacancies, unemployment is lower because the unemployed find jobs more easily, and the diminishing returns to individual inputs (search effort) imply the convex shape.

Hitherto, the model has been kept in a simple form. The model is static, we can extend the model by introducing growth in the labour force. Denote n as the growth rate of the labour force L. In equilibrium: $s(1-u)L+nL - q(\theta)\theta uL = unL$, where $s(1-u)L+nL$ is the flow into unemployment and $q(\theta)\theta uL$ is the flow out of unemployment. Hence, equation (8) becomes: $u=(s+n)/(s+n+\theta q(\theta))$. Thus, growth in the labour force shifts the u–v curve to the right, raising both unemployment rates and vacancies.

Furthermore, we introduce search intensity and job advertising. Denote cu as the efficiency units of searching workers and av as the efficiency units of job vacancies. The intensity of search chosen by the workers, i.e., their search behaviour, can influence the equilibrium outcome. The variables c and a could be thought of as the fraction of the period during which the worker and firm, respectively, are actively searching. These two variables are market variables; i.e., they are, respectively, the search intensity of the representative unemployed worker and the level of job advertising of the representative hiring firm. The main effect of considering search intensity and job advertising is on the transition probabilities, they now depend on c and a as well. Hence, $h=\theta q(c,a,\theta)$.

Finally, the steady state u–v relationship that we consider as our theoretical underpinning for the empirical part is:

$$u=(s+n)/(s+n+\theta q(\theta,c,a)) \tag{9}$$

where s is the separation rate, n the growth rate of the labour force, θ the ratio of vacancies to unemployment or labour market tightness, c the search effectiveness parameter, and q(.) is the hiring or engagement rate (i.e., the rate at which vacant jobs are filled).

IV. The econometric analysis of unemployment flows and vacancies.

We present in this section an econometric analysis of the relationship between unemployment and vacancies. First, we examine the duration relationship between unemployment and vacancies. Second, we estimate the unemployment–vacancy locus and we provide some explanations of the reasons behind the outward shift on this locus. Finally, we focus on the outflow rate to examine the problem of search externalities and multiple equilibria. All the variables are defined in the data appendix.

1. *The duration of unemployment and vacancies.*

For a worker is costly to be unemployed, and for a firm is also costly to open up and keep a vacancy. Both costs are directly proportional to the expected duration of unemployment and of a vacancy, respectively. Therefore, it seems relevant to examine the possible relationship between both durations. We then estimate the regression[6]:

$$\ln(\text{u duration})=\alpha_0+\alpha_1\ln(\text{v duration})+\alpha_2 t+\text{dummies} \tag{10}$$

where we allow for lags of the dependent variable and of the regressors. The variable t is a time trend to capture omitted factors. The equation is estimated from annual data over the period 1977–1991, by OLS and using instrumental variables, where the instruments are a measure of competitiveness, le, the budget deficit as a proportion of GDP, bdpgdp, and a measure of Spanish productivity, prod. The results are reported in Table 2.

It is important to point out that we use the duration of official vacancies. Thus, we initially examine the relationship between the duration of unemployment and the duration of official vacancies. However, we will examine below the duration of unemployment and the duration of total vacancies (official and private vacancies, for different values of k).

[6] See Jackman et al. (1989) for a similar analysis for the U.K.

We introduce dummies to control for changes in the unemployment protection system. The estimates in columns 2, 3, and 5 have the right signs and they are statistically significant. Our results suggest that, during the period under analysis, the duration of unemployment and the duration of vacancies did not have any long–run relationship.

The variables which influence duration are those variables which influence the intensity of search (replacement ratio rr and the proportion of long term unemployment ltu) and variables which proxy structural mismatch, mm, in the economy. Therefore, to explain the effects captured by the trend, we introduce the replacement ratio, mismatch, and the proportion of long term unemployment (Table 2, columns 6 to 12). Only the replacement ratio variable turned out to be correctly signed and statistically significant (column 12), however, the evidence seems to be weak.

The signs of the legislation dummies deserve comment. Since 1985, and especially since 1989, together with the new unemployment benefit legislation, several measures to reduce long term unemployment have been implemented, such as giving social security incentives to employers to hire the long term unemployed. During the period 1980–84, despite the reduction in the number of unemployed liable to unemployment benefits, there were no measures to fight against long term unemployment, and the results suggest that the legislation was not positive as to the duration of unemployment. Especially significant is the fact that the proportion of youths in the long term unemployment pool has been around 50%, although their share in the labour force has been around 21%. Furthermore, of those long term unemployed who comprise 30–34% of the total unemployment pool, 45% are looking for their first job. This group was not affected by the 1980–84 measures, but they were affected by the 1985–91 measures. Furthermore, the introduction of new types of contracts since 1985 may have helped to reduce the duration of unemployment as well.

2. *The unemployment–vacancy curve.*

We saw that the unemployment rate is a function of the inflow rate, s, and of the outflow rate, h, u=u(s,h) such that, $u'_s>0$ and $u'_h<0$. When there are more vacancies, for any given unemployment rate, there are more job matches taking place, so the outflow rate is higher (ceteris paribus). Therefore, there is an inverse relationship between unemployment and vacancies: the u–v curve.

Our aim is to estimate the relationship between unemployment and vacancies, taking into account the possibility of corrected vacancies series for different values of k (the relative efficiency of private advertising).

We first approximate (9) by:

$$\ln(u)=\alpha_0+\alpha_1\ln(u)_{-1}+\alpha_2\ln(v)+\alpha_3\ln(s)+\alpha_4\text{dummies} \tag{11}$$

where we allow for a richer lag structure. The dummies control for legislation changes, and we also include a dummy to control for the outward shift in the u–v locus from 1977 to 1984.

We estimate this relationship using the corrected and the original vacancy series. The equation is estimated by OLS and instrumental variables. The results are reported in Table 3A. We only report the OLS estimates, the estimates using instrumental variables are very similar.

Vacancies affect unemployment in the expected direction and are statistically significant, the flows into unemployment have a significant and positive effect, and the time shift captures some relevant effects. We can observe that these general results do not vary much whether we use the corrected vacancy series or the original series. However, lagged effects of vacancies and of the inflow rate turn out to be more and more statistically relevant as the corrected vacancies give more relevance to named outflows (i.e., higher is k and less close is V to V^0), but some problems of possible serial correlation seem to arise.

We now turn our attention to the outward shift of the u–v curve. We introduced above the time shift dummy to control for this shift and, thus, to be able to see the relationship between unemployment, vacancies and the inflow rate. Our aim is now to explain this outward shift.

The u–v locus shifts to the right when there is a change in one of the exogenous variables which either raises the inflow rate or reduces the outflow rate. We are treating all changes in the inflow rate as exogenous, so any rise in the inflow rate would shift the u–v locus to the right. There are several possible explanations of an outward shift. First, increases in the labour force due, for example, to increases in participation or pure demographic effects would shift the u–v locus to the right. Second, the proportion of long term unemployed in the unemployment pool, the replacement ratio, and other factors which affect the effectiveness of searching (search behaviour, unemployment benefit system legislation, employment protection legislation), as well as variables that proxy structural mismatch in the economy, would shift the u–v locus to the right, reducing the outflow rate.

Labour is not homogeneous, it differs with respect to region, industry, and occupation. If the ratio of unemployment to vacancies differs between regions and sectors, the national economic observations of unemployment and vacancies will lie to the right of the curve for the individual sectors, due to the convexity of the curve. Hence, an increase in mismatch will increase the level of unemployment for the given level of vacancies. An increase in unemployment income with respect to wages (i.e., the replacement ratio) will tend to raise the reservation wage and reduce the exit from unemployment, so unemployment will increase. The proportion of long term unemployment affects unemployment through its effect on search intensity, c. The higher the proportion of long term unemployment the lower c will be. A lower level of c reduces hiring which entails more unemployment at given vacancies.

With respect to the demographic factors, we consider three different measures: (i) the growth rate of the labour force; (ii) the growth rate of young people (16–24) in the labour force[7]; and (iii) the growth of the variable working age population minus employment$_{-1}$, (WAP–N$_{-1}$). The latter demographic variable is justified in the sense that the unemployment pool is formed by the flows out of unemployment and the flows into unemployment. The former consists of outflows to employment and outflows to the pool of those out of the labour force. The inflows to unemployment consist of inflows from employment and inflows from the pool of those out of the labour force. Therefore, the change in the net inflow from both of the flows to and from employment are gathered by the separation rate and the engagement rate, respectively. However, the net flows from the pool of those out of the labour force have not been considered so far. The growth of (WAP–N$_{-1}$) intends to measure changes in the net inflow from the pool of those out of the labour force[8].

We present our investigation of possible explanations of the outward shift of the u–v curve in Table 3B. To explain the outward shift we introduce as explanatory variables the proportion of long term unemployment, the replacement ratio, a measure of mismatch, and demographic effects. We begin with an overparametrised general specification:

$$\begin{aligned}\ln(u)=&\beta_0+\beta_1\ln(u)_{-1}+\beta_2\ln(s)+\beta_3\ln(s)_{-1}+\beta_4(\text{demographics})+\beta_5(\text{legislation}\\ &\text{dummies})+\beta_6[\ln(v)+\ln(1+kr)]+\beta_7[\ln(v)+\ln(1+kr)]_{-1}+\\ &\beta_8[\alpha_1 ltu+\alpha_2 rr+\alpha_3 mm]\end{aligned} \tag{12}$$

Where $r=OUT^n/OUT^u$. We run the above specification for several values of $k\epsilon[0,1]$, we introduce ltu, rr, and mm separately and with one lag, and we try different demographic variables

The main results we obtain from our experimentation are the following. First, the legislation dummies are not significant anymore. Second, the replacement ratio and

[7] This is one of the factors that explains the shift of the UK u–v relationship (Pissarides, 1986).

[8] For a similar approach, see Budd et al. (1988).

mismatch variables are always wrongly signed. Third, we could not find any significant effect of demographic variables. We experimented with the labour force growth, the growth of the 16–24 years old labour force, the growth of (WAP–Employment$_{-1}$), and the participation rate, without any success. Blanchard and Diamond (1989) find, for the USA, that increases in the labour force are translated into an increase in employment in about a year, therefore, increases in the labour force entail an increase in unemployment which dies out within a year. This could explain why we do not find any significant effect of the above demographic variables. Yet, demographic effects were at work in the shift of the uv curve in the UK. We proxied the growth of labour force by the growth of employment, following the Blanchard and Diamond result. We then found a significant negative coefficient on the growth of employment. That is, increases in the labour force, which are translated into increases in employment in about a year, tend to reduce unemployment. Fourth, the proportion of long term unemployed in the unemployment pool appears to explain to a large degree the outward shift in the u–v curve. We could conclude that changes in search intensity may have been at work. Fifth, levels (current and one lag) of vacancies are significant and with the expected sign. The long run elasticity of unemployment to vacancies is –0.265. Unemployment responds to changes in vacancies in the expected direction, but in a very small proportion. Therefore, unemployment seems to react slightly to factors in the labour market. It is quite structurally stable. The results thus entail a relatively flat u–v curve.

Our chosen specification is then:

$$\begin{aligned}\ln(u)=&\varphi_0+\varphi_1\ln(u)_{-1}+\varphi_2\ln(s)+\varphi_3[\ln(v)+\ln(1+kr)]+\\&\varphi_4[\ln(v)+\ln(1+kr)]_{-1}+\varphi_5\mathrm{ltu}\end{aligned}\tag{13}$$

With respect to the replacement ratio, the increase in unemployment benefit income with respect to wages may help to partially explain the outward shift of the u–v curve in

Spain, however, the evidence is weak. With regard to mismatch, calculations of the extent of mismatch using several indices, described in Padoa–Schioppa (1991), and reported, in the case of Spain, by Bentolila and Dolado (1990), show no general increase in mismatch during the data period. Thus, increased mismatch could not explain the outward shift in the Spanish u–v curve. In the regressions reported, we used the turbulence index (Layard and Nickell, 1986), defined as the changes in the structure of employment, as our measure of mismatch. The proportion of long term unemployment may have been a relevant factor in explaining the outward shift of the u–v curve in Spain. For the same finding see Bean and Gavosto (1990), and Jackman et al. (1989) for the U.K., Franz (1987b) for Germany, and Budd et al (1988) for a number of European countries.

Yet, the outward shift is still unexplained to a large degree[9]. Thus, the obvious question is: What else can explain the outward shift of the u–v curve in Spain? The more attractive explanation is a change in the job search behaviour of the unemployed, which has reduced search effectiveness or intensity. However, it is a very difficult variable to quantify. A fall in search effectiveness, c, leads to a downward shift in the hiring function, or in other words, to an outward shift in the u–v curve. The problem is how to measure c. We need a deeper analysis of search behaviour of the unemployed in Spain, an analysis which has not been done so far. However, an increase in θ, labour market tightness, implies an increase in the intensity of search. Workers search more intensely when the ratio of jobs to workers goes up because the chances that they will find a job improve. We can calculate labour market tightness in Spain. In Figure 10 we plot this variable, which has been falling since 1977 and only for the recovery period, 1986–1991, does it reach its prior level. Therefore, we could infer that a change in search effectiveness has been at work in Spain, and it is this change which may have subsequently shifted the u–v curve in the 1980s.

There could be many reasons for the change in job search effectiveness. The role of

[9]The standard error of the regression is higher in the explaining the shift specification (Table 3B) than in the u–v specifications with only dummies (Table 3A), 0.032 compared to 0.012.

unemployment benefits and of long term unemployment have already been discussed. An important factor could also be the discouraged worker effect on participation and searching produced by the economic crisis. The participation rate in Spain has been heavily procyclical. In the recovery period, 1986–1990, the participation grew together with the economy, which explains the poor performance of unemployment rates despite the large increase in employment. We emphasize the need for a deeper study of the job search behaviour of the unemployed.

Estimation of k. k measures the relative efficiency of private advertising. Values of $k<1$ mean that private advertising is more efficient than the PES in the sense that the duration of a job opening through the private route is lower than through the PES.

We could estimate k given our chosen specification, equation (13), using non–linear methods. It could be the case that the NLS estimation leads us to a local maximum instead of a global one. To check that possibility we used a graphical visualization of standard errors for different values of k ranging from 0 to 1. The NLS estimation gives $k=0.366$, while the graphical visualization hints $0.3\leq k\leq 0.45$ with a minimum standard error at $k=0.365$ and $k=0.37$. Therefore, we could conclude that $k\simeq 0.366$, which means that the private route is relatively more efficient. Furthermore, given that $1.9\leq OUT^n/OUT^u\leq 7.5$ and $V^p=(k*OUT^n/OUT^u)\ V^o$, then $0.6954\leq V^p/V^o\leq 2.745$, private vacancies may have been larger than official vacancies during the period under investigation.

We also tried to estimate changes in k during this period. The relative efficiency of private advertising, k, may depend on the state of the labour market. For example, in *depressed labour markets*, where unemployment is high and rising and there are few job openings, the labour market is not tight in the sense of how difficult it may be to fill a job opening. The general duration of a vacancy may thus fall, and therefore, a higher proportion of firms may use the PES to fill their job openings given the assumption that private advertising is costly. Hence, OUT^n may fall with respect to OUT^u and we then expect that k will rise. In a *recovery period*, where unemployment is falling and there are more job openings, the labour market becomes tighter in the sense that it becomes more and more difficult to fill job openings. So, the general duration of a vacancy may rise. Therefore, a higher proportion of firms may fill their job openings directly through private advertising. So, OUT^n will rise with respect to OUT^u and we then expect that k will fall.

Therefore, k rises in slumps and falls in booms, meaning that in recovery periods private advertising may be more efficient. We can then express k as:

$$k=k(x) \text{ with } k'<0,$$

where x is an index of labour market tightness. An increase in labour market tightness (recovery period) entails an improvement of the relative efficiency of private advertising. If we set $k=k_0-k_1x$ and $r=OUT^n/OUT^u$, we substitute $\ln[1+(k_0-k_1x)r]$ in our chosen specification and, using non–linear methods, we can estimate k_0 and k_1, and hence k and its changes. The question is now to choose an appropriate measure of labour market tightness. We used the rate of change of unemployment, the real effective exchange rate, employment growth, the rate of growth of engagements, and the GDP growth rate. Our investigation produces a value of k in accordance with the NLS estimation above. Moreover, it suggests that k has not varied much over the period under analysis (k_0 is generally significant, but k_1 is not). Therefore, the results suggest that k has been quite stable around 0.366.

Therefore, we have found that $k \simeq 0.366$, this value of k produces the best fitted equation and the minimum standard error (NLS techniques). However, this is achieved at the expense of possible serial correlation problems, as the LM test for serial correlation seems to suggest. Meanwhile, values of $k \simeq 0.2$ produce a reasonably well fitted equation, a low standard error, and it does not present serial correlation problems. We then believe that, taking into the account the tradeoff between goodness of fit and possible serial correlation problems, k varies between k=0.2 and k=0.366.

In Table 3B, we present our chosen specification with k constrained to 0.366

(column 8), and with k constrained to 0.2 (column 3). We thought that given these results there is the scope for testing for common factors: the coefficients on $\ln(u)_{-1}$ and $\ln(v)_{-1}$ are approximately half of the coefficients on the current level counterparts. The Wald test for the coefficient restriction: $\varphi_4 = -\varphi_1 * \varphi_3$ accepts it. In columns 9 and 10 we then present the results of imposing this restriction. We also tested for the effects of the changes in legislation. They are in the right direction but not significant, the 1985 and 1989 measures tended to reduce unemployment and the new contract legislation seems to be in the same direction, yet, they are not significant.

Finally, we investigate for several values of k the relationship between the duration of unemployment and the duration of total vacancies. We could then see whether the duration relationship suggest a value of k similar to the one obtained in the exercises above. We estimate the regression given by (10), but this time we use the duration of total vacancies as a regressor instead of the duration of official vacancies. We also introduce the replacement ratio, mismatch, and the proportion of long term unemployment to explain the effects captured by the trend. After some experimentation we reach the same type of results as before, presented in Table A2, columns (13) and (14). The estimation process suggests values of $k \epsilon [0.2;0.3]$. However, NLS techniques do not provide a clear cut, because they produce $k \epsilon [0.3;0.4]$, but they are not statistically significant.

We could then conclude that k varies between 0.2 and 0.366. We will further check this value of k when we examine the outflow rate from unemployment.

3. *The outflow rate from unemployment and search externalities.*

We focus now on the existence of search externalities and their possible implications. Search externalities work through the outflow from unemployment.

To be unemployed is costly for workers and this cost is directly proportional to the expected duration of unemployment. To open up a job vacancy is costly for the firm and it is also costly to keep the job vacant until a match is reached. These costs are directly proportional to the expected duration of a vacancy. The expected durations of unemployment and of a vacancy depend on what other firms and workers do. We saw in Section Three that the dependence of the vacancy engagement rate function $q(\theta)$ and the unemployment outflow rate function $\theta q(\theta)$ on the relative number of vacancies and unemployed people (tightness) was a cause of search externalities. What firms and workers do has an effect on the transition probabilities of other firms and workers. For example, if a firm decides to open one more vacancy, given the intensity of search, the expected duration of unemployment for the representative worker falls and the expected duration of a vacancy rises. So, workers are better off and firms are worse off. Therefore, there is a positive externality for workers, they increase the intensity of their search because they are more likely to find a job. However, there is a negative externality for firms. With more vacancies, the chances of vacancies being filled are reduced for all firms. But there is also a positive externality for all firms, the increase in worker's search intensity raises the effective labour to each firm and, hence, the expected duration of a vacancy may fall. Which externality effect dominates on the duration of vacancies is important. If the positive externality is larger, an increase in vacancies will lead to a situation of lower unemployment for higher vacancy rate. If the negative externality dominates, equilibrium unemployment will be higher at a higher vacancy rate.

One of the important effects of the existence of search externalities could then be that they may induce multiplicity of equilibrium levels of unemployment. Following Pissarides (1986) we will test only one aspect of the problem of multiplicity: multiple equilibria would arise if flows out of unemployment are characterized by increasing returns in vacancies and unemployment. This implies that the sum of the elasticities of the outflow rate, with respect to vacancies and unemployment, should be positive.

Therefore, we first need to investigate what determines the outflow rate and, then, we can test the restriction that the sum of the elasticities of the outflow rate, with respect to vacancies and unemployment, is zero (i.e., constant returns).

We examine what determines the outflow rate by estimating the following regression:

$$\text{uorate}=\beta_0+\beta_1\text{uorate}_{-1}+\beta_2\text{v}+\beta_3\text{v}_{-1}+\beta_4\text{u}+\beta_5\text{u}_{-1}+\beta_6\text{rr}+\beta_7\text{mm}+\beta_8\text{ltu}+\beta_9\text{t} \qquad (14)$$

where uorate is the unemployment outflow rate, v is the vacancy rate, u is the unemployment rate, rr is the replacement ratio, mm is an index of mismatch, ltu is the proportion of long term unemployment, and t is a time trend.

The above equation is estimated with non–linear terms in vacancies and unemployment. However, we also estimate the following logarithmic specification:

$$\begin{aligned}\ln(\text{uorate})=&\alpha_1+\alpha_2\ln(\text{uorate})_{-1}+\alpha_3\ln(\text{v})+\alpha_4\ln(\text{v})_{-1}+\alpha_5\ln(\text{u})+ \alpha_6\ln(\text{u})_{-1}+\\ &\alpha_7\text{rr}+\alpha_8\text{mm}+\alpha_9\text{ltu}+\alpha_{10}\text{t} \qquad (15)\end{aligned}$$

We present the results of our investigation of the determinants of the outflow rate in Table A4. We experimented with logarithmic and linear specifications of the equation as well as with linear and non–linear terms in unemployment and vacancies. We also experimented with several values for k. We present the results for the estimation of equation (14) with non–linear terms in unemployment and vacancies, and for the estimation in logs (equation (15)). The results presented are for corrected vacancies, where k=0, 0.2, 0.3, 0.366. The lag structures reported are the result of experimentation.

The variables which influence the outflow rate in the steady state are vacancies, unemployment, variables which influence the intensity of search (replacement ratio, the proportion of long term unemployment, and time trend), and variables with proxy structural mismatch in the economy. The mismatch index is as above (see the appendix for the definition). We did not find significant the replacement ratio, thus unemployment benefits are not a relevant variable to explain the fall in the Spanish outflows from unemployment. The proportion of long term unemployment as a proxy of intensity is significant. Mismatch effects do not seem to be at work. The time trend intends to capture unobserved changes in search effectiveness or intensity and any other omitted variables.

The results suggest that an increase in vacancies will increase the outflow rate. When there are more vacancies available, the probability of getting a job may rise. The relevant effect of unemployment in the outflow rate is its rate of change. Increases in the rate of change of unemployment reduce the outflow rate, yet in the long run unemployment is neutral. In the long run only vacancies and the proportion of long term unemployment seem to affect the outflow rate. Increases in the proportion of long term unemployment in the unemployment pool will reduce the outflow rate, this supports the claim that long term unemployed people are less likely to get a job than are recently unemployed people. There is negative trend in the outflow rate, which may suggest reductions in job search intensity.

We could now check the problem of multiple equilibria. We test the restriction that the sum of the elasticities of the outflow rate, with respect to unemployment and vacancies, is zero. This means that under the null only the ratio of vacancies to unemployment is the relevant effect, against the alternative that both the ratio and the levels of vacancies and unemployment are relevant (i.e., H_0:V/U only, against H_1:V/U, V, U). In the case of the logarithmic specification (equation (15)), and the specification (14) with non–linear terms in unemployment and vacancies, this hypothesis means that under the null the sum of the coefficients on the log terms in vacancies and unemployment is equal to zero (i.e. $H_0{:}\,\alpha_3+\alpha_4+\alpha_5+\alpha_6=0$).

We cannot accept the null that the sum of the elasticities of the outflow rate, with respect to unemployment and vacancies, is zero. The Wald chi–square test of restrictions on the coefficients does not support the null (see the notes beneath Table A4).

Thus, we cannot reject the possibility that search externalities have generated multiple equilibria in the case of Spanish outflows. However, more research needs to be done to determine the causes.

Finally, the results in Tables 3 and 4 suggest the same value of k, that is

$k \epsilon (0.2, 0.366)$. The combination or tradeoff between the goodness of fit measured by the minimum standard error, and the possibility of serial correlation problems, as the LM test suggests, incline us to claim that $k \simeq 1/4$. Therefore, official data on vacancies need to be corrected by around a quarter to obtain meaningful vacancy data.

V. Conclusions.

In this paper we have examined unemployment flows and the relationship between unemployment and vacancies in order to reach a better understanding of the Spanish unemployment problem. The unemployment rate is a function of the inflow and outflow rates, and the availability of vacancies affects the outflow rate. Thus, there exists a relationship between unemployment and vacancies, the u–v curve.

We saw that the rise in unemployment and its persistence at high levels could be accounted for by the inability of the flows out of unemployment to keep track and offset the flows into unemployment, as was the case before 1977 and after 1986. Therefore, the unemployment problem may lie behind the changes in the probability of leaving unemployment with respect to the inflows.

Job vacancies affect the flow out of unemployment and, in turn, unemployment. The analysis of the simultaneous movements of unemployment and vacancies can inform us about the functioning of the labour market and of the unemployment problem in particular. First, we proposed a way of correcting the administrative vacancy data given the main features of the data at hand. There exist privately advertised vacancies which are not included in the official data on vacancies. We then used the relationship between the duration of a vacancy taking the INEM route, and the duration of a vacancy taking the private route, to construct a correction factor. Second, we estimated the u–v curve, controlling for the outward shift and changes in legislation in order to see the direct relationship between unemployment and vacancies. We then presented an investigation of the causes behind the outward shift in the u–v curve. Changes in search intensity proxied by the proportion of long term unemployment seemed to explain this outward shift. Third, the entire analysis of the u–v curve was carried out using the corrected vacancy series for different values of the correction factor. We then estimated the more likely values of the relative efficiency of private advertising parameter (i.e., the correction factor) using non–linear techniques. Private advertising seems to be more efficient and the corrected vacancy series have a higher proportion of privately advertised vacancies than official ones because named outflows are quite large with respect to unnamed outflows in the period under investigation. Finally, we investigated what determines the outflow rate from unemployment. Changes in the unemployment rate, the level of the vacancy rate, and the proportion of long term unemployment are the main factors behind the movements of the outflow rate. This rate presents a negative trend all through the period. We investigated the possibility of the flows out of unemployment being characterised by increasing returns in vacancies and unemployment, and we could not reject it. Search externalities may have created problems of multiple equilibria (however, this was an initial and partial investigation of this problem).

The main result of this investigation is that official data on vacancies are substantially distorted. The official data need to be corrected by a quite large factor (around 1/4 of the ratio of named to unnamed vacancy outflows) to obtain meaningful data on vacancies.

Unemployment seems to be quite structural and changes in job search intensity may explain the unemployment problem. To tackle the unemployment problem efforts need to be directed towards increasing the probability of leaving the unemployment pool and, thus, increase the flow out of unemployment.

We support the view that changes in the job search behaviour of the unemployed have been at work[10].

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[10]Recent studies of Spanish migration behaviour (Bentolila and Dolado, 1990) suggest that the job search effectiveness of the unemployed in Spain has fallen due to a decline in regional migration flows.
Antolin (1993) finds that job search behaviour and job search intensity have changed in Spain.

Appendix A: Tables and Graphs.

Tables A1.

Unemployment (000s).

Years	Inflow	Outflow	Unemploy– ment Stock	Duration
1977	45.966	45.123	675.980	14.98094
1978	62.566	35.035	906.750	25.88143
1979	56.134	41.356	1122.700	27.14673
1980	62.492	28.877	1487.800	51.52480
1981	63.026	32.275	1853.000	57.43372
1982	55.130	36.853	2120.450	57.53654
1983	60.853	39.650	2340.530	59.02895
1984	62.749	29.492	2728.230	92.50497
1985	73.463	50.581	2938.550	58.09545
1986	70.392	72.386	2932.930	40.51912
1987	32.315	50.962	2937.750	57.64527
1988	28.479	37.880	2847.900	75.18179
1989	38.412	57.371	2560.830	44.63618
1990	43.942	51.143	2441.150	47.73239
1991	58.390	49.291	2463.680	49.98312

Nb.1. See data appendix for source and definitions.
Nb.2. Monthly averages.

Registered Vacancies (000's).

Years	Inflow	Outflow	Vacancies Stock	Duration
1977	25.791	25.582	13.337	0.521343
1978	30.249	29.909	15.441	0.516266
1979	46.302	45.998	19.269	0.418909
1980	56.769	57.376	15.172	0.264431
1981	51.215	51.216	11.434	0.223246
1982	20.963	20.776	12.870	0.619465
1983	16.701	16.278	18.498	1.136450
1984	28.220	27.385	23.185	0.846631
1985	48.591	47.221	38.624	0.817941
1986	52.446	53.234	46.105	0.866082
1987	53.929	53.005	46.297	0.873446
1988	60.106	60.017	55.249	0.920556
1989	63.522	63.458	58.453	0.921739
1990	57.034	57.152	51.657	0.903853
1991	51.425	52.533	41.446	0.801601

Nb.1. See data appendix for sources and definitions.
Nb.2. Monthly averages.

Years	Unemploy– ment Rate	Vacancy Rate	Inflow Rate	Outflow Rate
1977	0.051981	0.001082	0.003729	0.066752
1978	0.069696	0.001276	0.005169	0.038638
1979	0.086133	0.001618	0.004713	0.036837
1980	0.114060	0.001313	0.005407	0.019408
1981	0.141668	0.001018	0.005612	0.017411
1982	0.160183	0.001158	0.004959	0.017380
1983	0.174863	0.001675	0.005510	0.016941
1984	0.202518	0.002158	0.005841	0.010810
1985	0.216388	0.003630	0.006904	0.017213
1986	0.212327	0.004237	0.006469	0.024680
1987	0.205339	0.004072	0.002842	0.017347
1988	0.194623	0.004690	0.002417	0.013301
1989	0.172804	0.004768	0.003134	0.022403
1990	0.162531	0.004107	0.003493	0.020950
1991	0.163450	0.003287	0.004631	0.020007

Nb. See data appendix for sources and definitions.

Registered Job Offers and Engagements.

Years	Named Outflows	Un–named Outflows	Named Inflows	Un–named Inflows	OUT^n/OUT^u
1977	79.766	25.582	79.766	25.791	3.118052
1978	85.490	29.909	85.490	30.249	2.858297
1979	91.834	45.998	91.834	46.302	1.996467
1980	110.243	57.376	110.243	56.769	1.921421
1981	120.731	51.217	120.731	51.215	2.357287
1982	120.551	20.776	120.551	20.963	5.802417
1983	113.110	16.277	113.110	16.701	6.948785
1984	131.008	27.385	131.008	28.220	4.783904
1985	175.108	47.221	175.108	48.591	3.708266
1986	211.500	53.234	211.500	52.446	3.973012
1987	246.908	53.005	246.908	53.929	4.658186
1988	265.125	60.017	265.125	60.106	4.417499
1989	313.800	63.458	313.800	63.522	4.945035
1990	387.700	57.152	387.700	57.034	6.783685
1991	384.725	52.533	384.725	51.425	7.323562

Nb. See data appendix for sources and definitions.

Table A2
Duration Regressions: 1977—1991
Dependent variable: ln(u duration)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	2.55	2.53	2.72	2.79	2.58	4.26	2.72
	(9.40)	(11.13)	(12.4)	(9.13)	(10.7)	(14.8)	(12.32)
ln(u duration)$_{-1}$	0.145	0.147	0.10	0.10	0.13	−0.02	0.075
	(1.94)	(1.93)	(1.37)	(1.52)	(1.64)	(−0.29)	(0.85)
ln(v duration)	−0.185			−0.07			
	(−2.24)			(−0.49)			
ln(v duration)$_{-1}$	0.19			0.15			
	(3.14)			(2.98)			
Δln(v duration)		−0.19	−0.17		−0.15	−0.15	−0.18
		(−3.36)	(2.82)		(−2.52)	(−4.27)	(−2.61)
t	0.11	0.11	0.09	0.09	0.11	0.07	0.08
	(3.62)	(5.44)	(7.64)	(2.37)	(4.88)	(6.51)	(3.35)
dl8084	0.38	0.37	0.52	0.46	0.38	0.53	0.52
	(2.77)	(3.88)	(7.09)	(2.90)	(4.07)	(18.8)	(7.24)
dl8588	−0.28	−0.29		−0.14	−0.27		
	(−1.11)	(−1.44)		(−0.52)	(−1.24)		
dl8991	−0.85	−0.87	−0.51	−0.65	−0.83	−0.49	−0.46
	(−2.66)	(−3.7)	(−4.7)	(−1.6)	(−3.2)	(−10.2)	(−2.79)
ltu						0.02	0.003
						(4.27)	(0.46)
rr						−3.97	
						(−5.08)	
mm						−0.09	
						(−1.71)	
R^2	0.91	0.9058	0.8951	0.8974	0.9040	0.9807	0.8956
σ	0.16	0.1430	0.1412	0.1612	0.1444	0.0765	0.1506
LM Test			1.2925		3.7309		

Continuation

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Constant	2.74	2.72	2.94	0.89	1.67	2.686	1.750
	(11.5)	(0.84)	(16.03)	(0.93)	(3.1)	(10.19)	(2.99)
$\ln(\text{u duration})_{-1}$	0.08	0.14	0.10	0.23	0.12	0.117	0.094
	(0.88)	(1.81)	(1.94)	(1.58)	(1.27)	(1.30)	(0.92)
$\Delta\ln(\text{v duration})$	–0.16	–0.08	–0.14	–0.10	–0.16	–0.150	–0.115
	(–1.86)	(–2.64)	(–1.6)	(–1.9)	(–2.9)	(–2.1)	(–2.12)
t	0.08	0.07	0.10	0.06	0.03	0.111	0.027
	(3.69)	(4.24)	(10.6)	(3.13)	(0.95)	(4.42)	(0.75)
dl8084	0.52	0.47	0.51	0.39	0.45	0.335	0.425
	(7.46)	(10.1)	(9.96)	(5.59)	(7.60)	(2.58)	(6.0)
dl8588						–0.296	–0.185
						(–1.15)	(–0.82)
dl8991	–0.48	–0.43	–0.53	–0.20	–0.20	–0.868	–0.185
	(–2.18)	(–3.8)	(–8.5)	(–1.02)	(–0.9)	(–2.8)	(–0.8)
ltu	–0.01						
	(–0.06)						
ltu_{t-1}	0.04			–0.02			
	(0.23)			(–1.67)			
rr		–2.72					
		(–3.18)					
rr_{t-1}		2.80		5.10	2.85		2.997
		(2.84)		(2.13)	(1.81)		(1.76)
mm			–0.19				
			(–2.08)				
mm_{t-1}			–0.08	–0.07			
			(–2.0)	(–1.62)			
R^2	0.8958	0.9595	0.9422	0.9363	0.9188	0.797	0.826
σ	0.1624	0.1013	0.1209	0.1391	0.1328	0.1542	0.1426
LM Test					4.3764		

Notes: Heteroscedastic consistent t—values in brackets
Columns (1) to (3) and (6) to (14) are estimated by OLS
Columns (4) and (5) are estimated by instrumental variables, where the instruments are $\ln(\text{vduration})_{-1}$, le and bdpgdp.
The dummy variables are described in the data appendix.
Columns (1) to (12) use the duration of official vacancies as regressor.
Columns (13) and (14) use the duration of total vacancies, using corrected vacancies for k=0.3

Table A3
Regressions of the u—v curve: 1977—1991
Dependent variable: ln(u)

A. Un—corrected, lv, and corrected vacancies, lcv1, lcv2, lcv3, lcv7, lcv.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C	−1.15	−1.20	−1.76	−2.02	−2.07	−2.19	−2.21
	(−2.27)	(−3.65)	(−3.53)	(−5.51)	(−5.21)	(−7.77)	(−6.59)
$\ln(u)_{-1}$	0.46	0.46	0.46	0.42	0.42	0.40	0.38
	(4.82)	(6.41)	(5.61)	(6.49)	(6.13)	(8.55)	(6.44)
ln(v)	−0.04	−0.04	−0.12	−0.11	−0.12	−0.12	−0.115
	(−0.77)	(−1.87)	(−4.37)	(−4.22)	(−5.33)	(−5.46)	(−6.23)
$\ln(v)_{-1}$	0.01		0.02		0.006		−0.007
	(0.20)		(1.01)		(0.35)		(−0.51)
ln(s)	0.06	0.07	0.06	0.05	0.04	0.05	0.04
	(2.08)	(4.04)	(3.19)	(4.17)	(3.32)	(4.24)	(3.33)
$\ln(s)_{-1}$	0.02		0.003		0.009		0.01
	(0.93)		(0.27)		(0.80)		(1.23)
shift	0.06	0.06	0.08	0.08	0.09	0.09	0.10
	(3.89)	(4.03)	(4.39)	(5.43)	(5.91)	(7.91)	(7.22)
dl8084	0.11	0.12	0.06	0.08	0.06	0.07	0.06
	(2.87)	(7.18)	(2.32)	(3.68)	(2.72)	(4.15)	(3.38)
dl8588	0.11	0.13	0.09	0.12	0.10	0.12	0.10
	(1.76)	(8.95)	(2.43)	(8.96)	(3.69)	(10.65)	(4.79)
dl8991	−0.01		−0.03		−0.01		−0.008
	(−0.18)		(−0.84)		(−0.67)		(−0.51)
$\overline{R}^2$	0.9934	0.9959	0.9965	0.9978	0.9980	0.9987	0.9986
σ	0.0279	0.0219	0.0202	0.0162	0.0154	0.0122	0.0130
LM test AR(1)		2.3845		0.64001		1.8076	

Continuation.

	(8)	(9)	(10)	(11)	(12)
C	–2.15	–2.35	–2.39	–2.36	–2.40
	(–8.70)	(–9.09)	(–9.87)	(–9.60)	(–10.34)
$\ln(u)_{-1}$	0.40	0.33	0.32	0.31	0.30
	(10.41)	(6.47)	(6.80)	(6.24)	(6.38)
$\ln(v)$	–0.12	–0.05	–0.09	–0.09	–0.09
	(–5.58)	(–8.82)	(–8.56)	(–9.89)	(–9.42)
$\ln(v)_{t-1}$		–0.02	–0.03	–0.03	–0.03
		(–2.62)	(–3.18)	(–3.28)	(–4.04)
$\ln(s)$	0.05	0.03	0.03	0.028	0.026
	(4.16)	(3.20)	(3.33)	(3.13)	(3.26)
$\ln(s)_{t-1}$		0.017	0.019	0.018	0.02
		(1.79)	(2.28)	(1.84)	(2.46)
shift	0.095	0.11	0.12	0.12	0.12
	(9.49)	(9.66)	(10.16)	(10.19)	(10.61)
dl8084	0.07	0.06	0.07	0.06	0.07
	(5.08)	(5.37)	(7.40)	(6.16)	(8.94)
dl8588	0.11	0.10	0.11	0.10	0.11
	(11.81)	(6.96)	(12.72)	(7.50)	(13.03)
dl8991		–0.007		–0.009	
		(–0.62)		(–0.86)	
$\bar{R}^2$	0.9990	0.9991	0.9993	0.9992	0.9993
σ	0.0109	0.0102	0.0092	0.0098	0.0089
LM test					
AR(1)	3.7648		4.1495		4.1326

Notes: Columns (1) and (2) are with the uncorrected vacancy series
Columns (3) and (4) are with the corrected vacancy series with k=0.1
Columns (5) and (6) are with the corrected vacancy series with k=0.2
Columns (7) and (8) are with the corrected vacancy series with k=0.3
Columns (9) and (10) are with the corrected vacancy series with k=0.7
Columns (11) and (12) are with the corrected vacancy series with k=1

The dummy variables are described in the data appendix.

The LM test for serial correlation is $\chi^2(p)$ under the null of no serial correlation, where p is the degree of correlation to test. At α=0.05 (95% of confidence) $\chi^2(1)$=3.841.

B. Explaining the Shift.

$$\ln(u)=\varphi_0+\varphi_1\ln(u)_{-1}+\varphi_2\ln(s)+\varphi_3\ln[V(1+kr)]+\varphi_4\ln[V(1+kr)]_{-1}+\varphi_5 ltu$$

	(1) k=0	(2) k=0.1	(3) k=0.2	(4) k=0.3	(5) k=0.5	(6) k=0.7
φ_0	–0.068	–1.186	–1.494	–1.514	–1.423	–1.339
	(–0.09)	(–1.83)	(2.91)	(–3.30)	(–3.02)	(–2.70)
φ_1	0.974	0.60	0.514	0.507	0.522	0.536
	(4.38)	(3.11)	(3.48)	(3.73)	(3.71)	(3.67)
φ_2	0.06	0.149	0.164	0.163	0.159	0.156
	(0.84)	(2.35)	(3.52)	(3.91)	(3.82)	(3.68)
φ_3	–0.067	–0.207	–0.237	–0.232	–0.212	–0.198
	(–1.03)	(–2.70)	(–3.64)	(–4.07)	(–4.06)	(–3.88)
φ_4	–0.039	0.083	0.105	0.10	0.085	0.074
	(–0.62)	(1.33)	(2.48)	(2.86)	(2.37)	(2.0)
φ_5	–0.005	0.012	0.016	0.017	0.016	0.016
	(–0.50)	(1.44)	(2.60)	(2.99)	(2.77)	(2.54)
$\bar{R}^2$	0.9814	0.9878	0.9912	0.9951	0.9920	0.9915
s.e	0.04686	0.03787	0.03229	0.030644	0.03079	0.03159
LM test	0.0059	0.04354	1.8708	3.9212	4.4281	3.80774

Notes: Heteroscedastic consistent t–values in brackets.
All the variables are described in the data appendix.

The LM test for serial correlation is $\chi^2(p)$ under the null of no serial correlation, where p is the degree of correlation to test. At α=0.05 $\chi^2(1)$=3.841.

	(7) k=1	(8) k=0.366	(9) k=0.366	(10) k=0.2
φ_0	−1.251	−1.488	−1.664	−1.625
	(−2.43)	(−3.26)	(−4.30)	(−3.88)
φ_1	0.548	0.511	0.450	0.467
	(3.67)	(3.74)	(6.98)	(6.92)
φ_2	0.154	0.162	0.175	0.175
	(3.55)	(3.92)	(6.18)	(5.89)
φ_3	−0.184	−0.225	−0.239	−0.248
	(−3.70)	(−4.13)	(−6.13)	(−5.70)
φ_4	0.065	0.095	0.108*	0.116*
	(1.72)	(2.74)		
φ_5	0.015	0.017	0.019	0.018
	(2.36)	(2.96)	(6.26)	(5.67)
$\bar{R}^2$	0.9910	0.9921	0.9929	0.9921
s.e	0.03257	0.030461	0.02892	0.030539
LM test	3.10840	4.45093		

Notes: Heteroscedastic consistent t—values in brackets.
All the variables are described in the data appendix.
The LM test for serial correlation is Chi—square(p) under the null of no serial correlation, where p is the degree of correlation to test. At α=0.05 Chi—square(1)=3.841.

Wald test for coefficient restriction H_0: $\varphi_4=-\varphi_1*\varphi_3$ gives χ^2=0.15272 for k=0.2, χ^2=0.20947 for k=0.3 and χ^2=0.28076 for k=0.366.

Columns (9) and (10) have the following ARCH test statistics χ^2=0.00458 and χ^2=0.06142 for k=0.2 and k=0.366, respectively.

* Constrained to be $-\varphi_1*\varphi_3$.

Table A4
Outflow Rate from Unemployment Regressions: 1977—1991
Dependent variable: ratio of monthly outflow to unemployment stock (uorate).
Non—linear terms in unemployment and vacancies.

	(1) k=0	(2) k=0	(3) k=0.2	(4) k=0.2
Constant	0.209	0.076	0.227	0.164
	(7.09)	(9.43)	(4.52)	(8.98)
$uorate_{-1}$	0.510	0.187	0.310	
	(4.54)	(2.94)	(2.41)	
ln(V rate)	0.010		0.013	0.012
	(3.05)		(2.39)	(4.42)
$\ln(V\ rate)_{-1}$	—0.013		—0.006	
	(—2.45)		(—1.15)	
Δln(V rate)		0.009		
		(3.04)		
ln(U rate)	—0.110		—0.081	
	(—6.94)		(—4.99)	
$\ln(U\ rate)_{-1}$	0.154		0.111	
	(7.13)		(4.95)	
Δln(U rate)		—0.085		—0.066
		(—5.90)		(—4.26)
ltu	—0.002	—0.001	—0.002	—0.001
	(—6.31)	(—6.55)	(—4.21)	(—13.10)
t	—0.001	—0.001	—0.002	—0.002
	(—1.35)	(—1.06)	(—2.05)	(—3.62)
$\bar{R}^2$	0.9197	0.8646	0.8739	0.8754
σ	0.0022	0.0029	0.0028	0.0028
LM test for AR(1)	6.2085	0.3498	6.2695	0.0080

Continuation: Non—linear terms in unemployment and vacancies.
Dependent variable: uorate.

	(5) k=0.3	(6) k=0.3	(7) k=0.366	(8) k=0.366
Constant	0.237	0.163	0.241	0.162
	(4.64)	(8.32)	(4.74)	(8.82)
uorate_{-1}	0.275		0.264	
	(2.20)		(2.11)	
ln(V rate)	0.012	0.012	0.012	0.012
	(2.16)	(3.95)	(2.06)	(3.77)
$\ln(\text{V rate})_{-1}$	−0.003		−0.002	
	(−0.82)		(−0.64)	
ln(U rate)	−0.081		−0.082	
	(−5.12)		(−5.22)	
$\ln(\text{U rate})_{-1}$	0.110		0.111	
	(5.16)		(5.31)	
Δln(U rate)		−0.067		−0.067
		(−4.52)		(−4.63)
ltu	−0.002	−0.001	−0.002	−0.001
	(−4.20)	(−12.97)	(−4.25)	(−12.71)
t	−0.002	−0.002	−0.002	−0.002
	(−2.59)	(−3.79)	(−2.85)	(−3.83)
$\bar{R}^2$	0.8703	0.8776	0.8696	0.8770
σ	0.0029	0.0028	0.0029	0.0028
Durbin's h	−1.9092	−0.0066	−1.8483	−0.0354
LM test for AR(1)	5.8072	0.0127	5.5703	0.00003

Continuation: logarithmic specification.
Dependent variable: log(uorate).

	(9) k=0	(10) k=0	(11) k=0.2	(12) k=0.2
Constant	6.331	0.759	7.162	1.537
	(1.72)	(0.81)	(1.99)	(1.95)
$\ln(\text{uorate})_{-1}$	0.433	0.023	0.255	
	(1.88)	(0.16)	(1.16)	
ln(V rate)	0.511	0.231	0.648	0.377
	(2.14)	(1.42)	(2.11)	(2.77)
$\ln(\text{V rate})_{-1}$	−0.539		−0.305	
	(−1.94)		(−1.31)	
ln(U rate)	−5.045		−3.939	
	(−3.86)		(−3.74)	
$\ln(\text{U rate})_{-1}$	6.617		5.289	
	(3.26)		(3.46)	
$\Delta\ln(\text{U rate})$		−4.002		−3.661
		(−3.79)		(−3.62)
ltu	−0.102	−0.047	−0.096	−0.049
	(−2.77)	(−5.50)	(−3.10)	(−7.90)
t	−0.038	−0.061	−0.070	−0.077
	(−1.21)	(−2.06)	(−1.96)	(−2.86)
$\bar{R}^2$	0.8057	0.7688	0.8155	0.8189
σ	0.1507	0.1644	0.1468	0.1455
LM test for AR(1)	3.4276	0.8313	4.0964	0.1652

Continuation: logarithmic specification.
Dependent variable: log(uorate).

	(13) k=0.3	(14) k=0.3	(15) k=0.366	(16) k=0.366
Constant	7.454	1.509	7.578	1.458
	(2.08)	(1.97)	(2.12)	(1.95)
$\ln(\text{uorate})_{-1}$	0.220		0.208	
	(0.99)		(0.92)	
ln(V rate)	0.618	0.377	0.597	0.371
	(2.03	(2.74)	(1.99)	(2.72)
$\ln(\text{V rate})_{-1}$	–0.212		–0.171	
	(–1.06)		(–0.91)	
ln(U rate)	–3.962		–4.009	
	(–3.74)		(–3.78)	
$\ln(\text{U rate})_{-1}$	5.309		5.364	
	(3.55)		(3.62)	
Δln(U rate)		–3.687		–3.716
		(–3.61)		(–3.62)
ltu	–0.097	–0.050	–0.097	–0.050
	(–3.22)	(–8.05)	(–3.28)	(–8.12)
t	–0.083	–0.080	–0.089	–0.080
	(–2.38)	(–3.04)	(–2.56)	(–3.11)
$\bar{R}^2$	0.8144	0.8196	0.8137	0.8190
σ	0.1473	0.1452	0.1476	0.1454
LM test for AR(1)	3.7057	0.2098	3.4715	0.2514

Notes: Estimated by OLS. Heteroscedastic consistent t—values in brackets.
Durbin's h statistic test for AR(1) serial correlation when the lagged dependent variable is a regressor. If $|h|<1.645$ we accept the null of no serial correlation, at 5% confidence level.

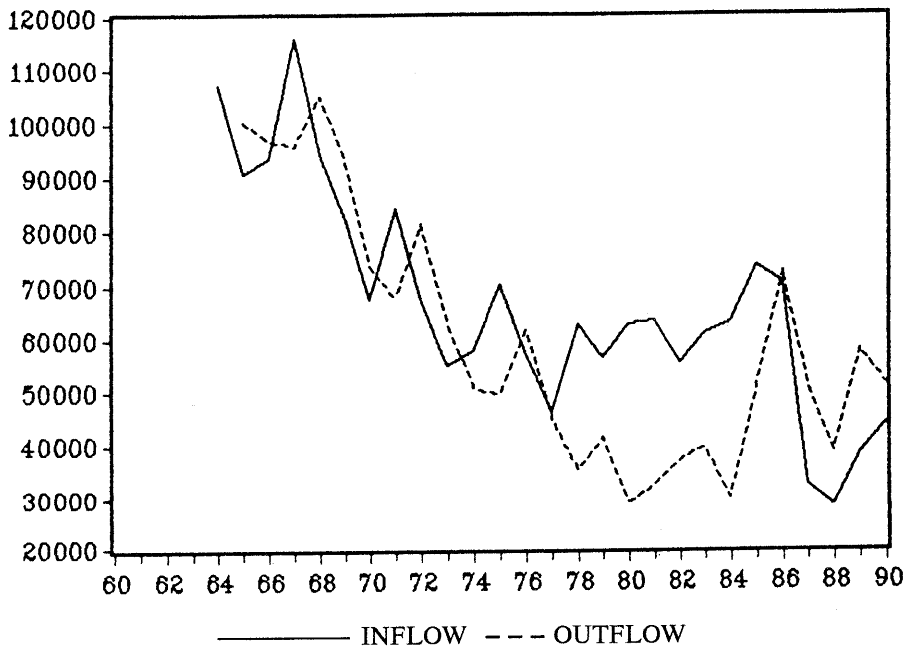
LM test for AR(1) serial correlation is distributed as $\chi^2(1)$. We accept the null of no serial correlation at 5% confidence if LM<3.841.

The Wald's chi—square statistics for the null $H_0: \alpha_3+\alpha_4+\alpha_5+\alpha_6=0$, on the logarithmic specification are:

chi—square(1)=8.26 for column (4).
chi—square(1)=8.29 for column (6).
chi—square(1)=8.57 for column (8).
chi—square(1)=4.21 for column (12).
chi—square(1)=4.61 for column (14).
chi—square(1)=4.83 for column (16).

FIGURE 1

a) Flows into and out of Unemployment (absolute values)



b) Flows into unemployment, us, and out of unemployment, uo. 1977-1991

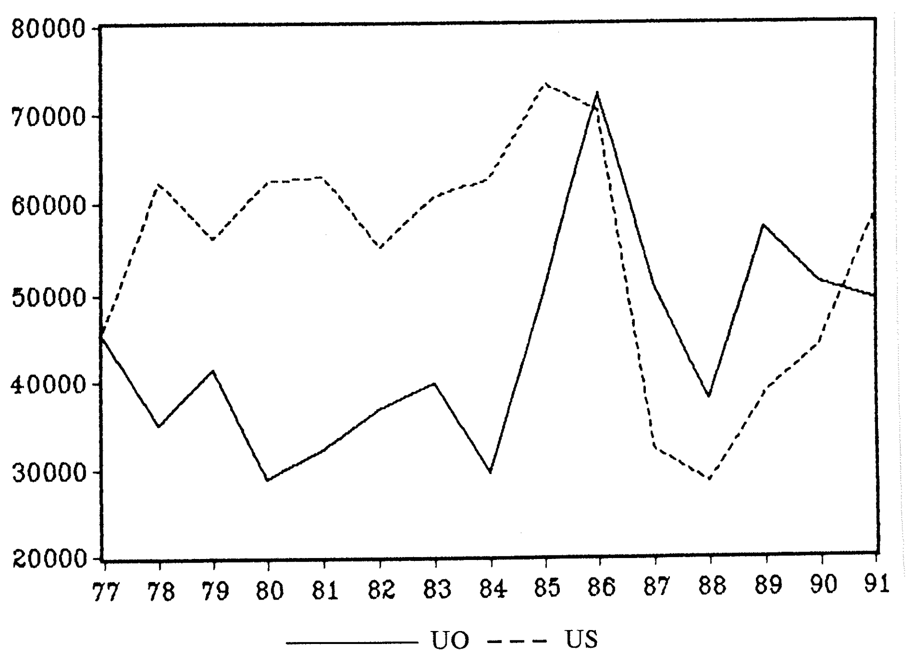


FIGURE 2

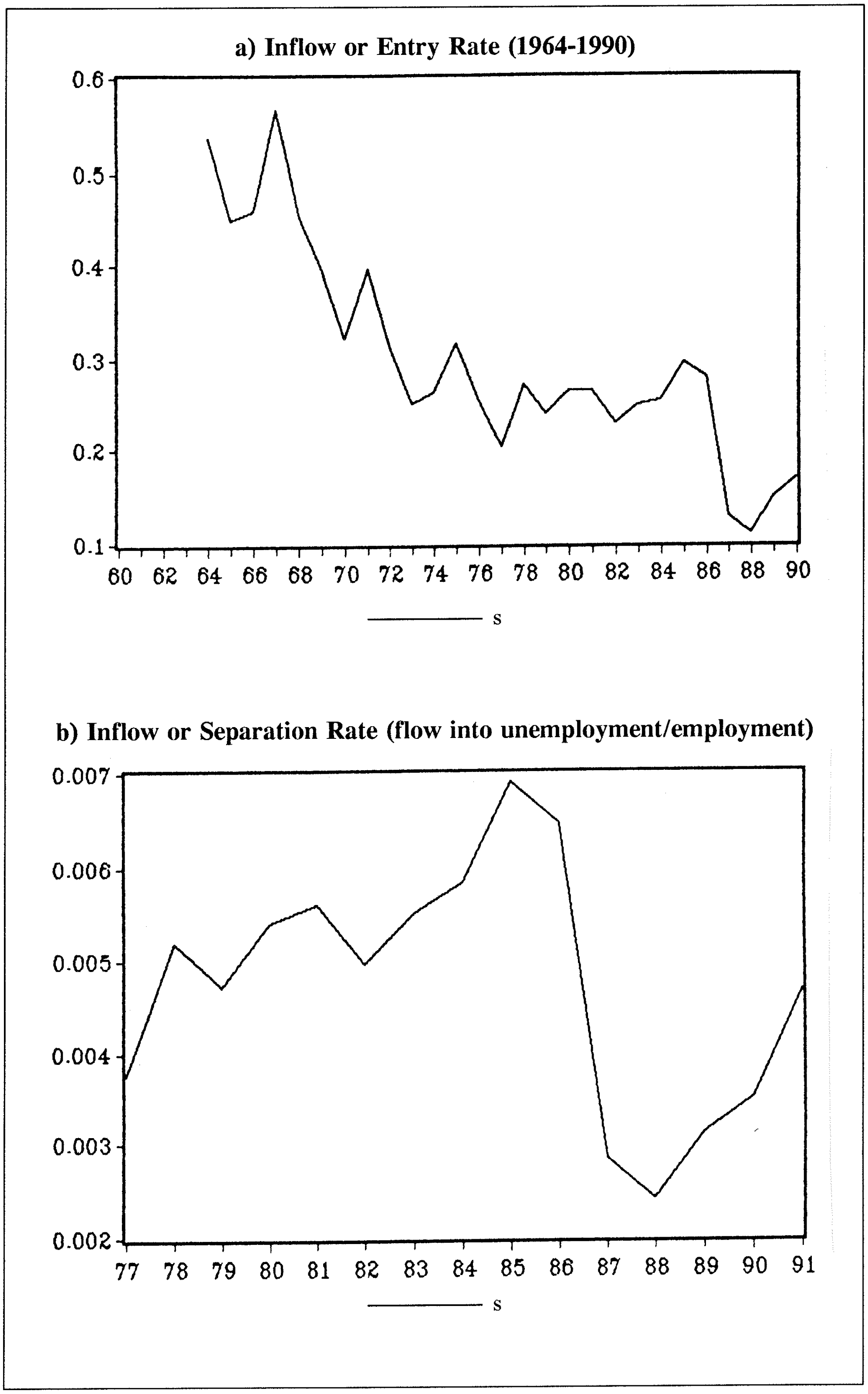
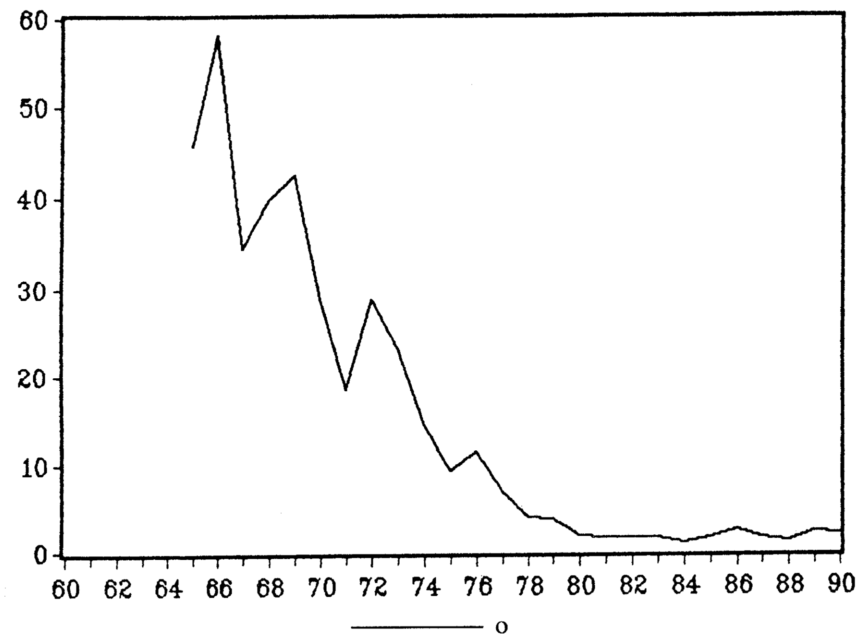

a) Inflow or Entry Rate (1964-1990)
0.6
0.5
0.4
0.3
0.2
0.1
60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90
s
b) Inflow or Separation Rate (flow into unemployment/employment)
0.007
0.006
0.005
0.004
0.003
0.002
77 78 79 80 81 82 83 84 85 86 87 88 89 90 91
s

FIGURE 3

a) Outflow or Exit Rate (1964-1990)



b) Unemployment Outflow Rate
(flow out of unemployment/unemployment)

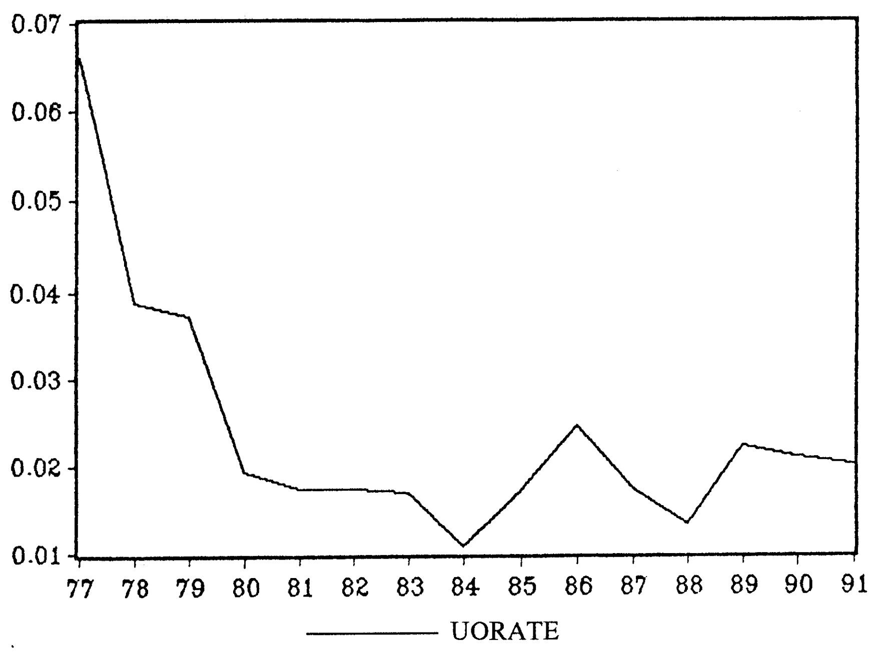
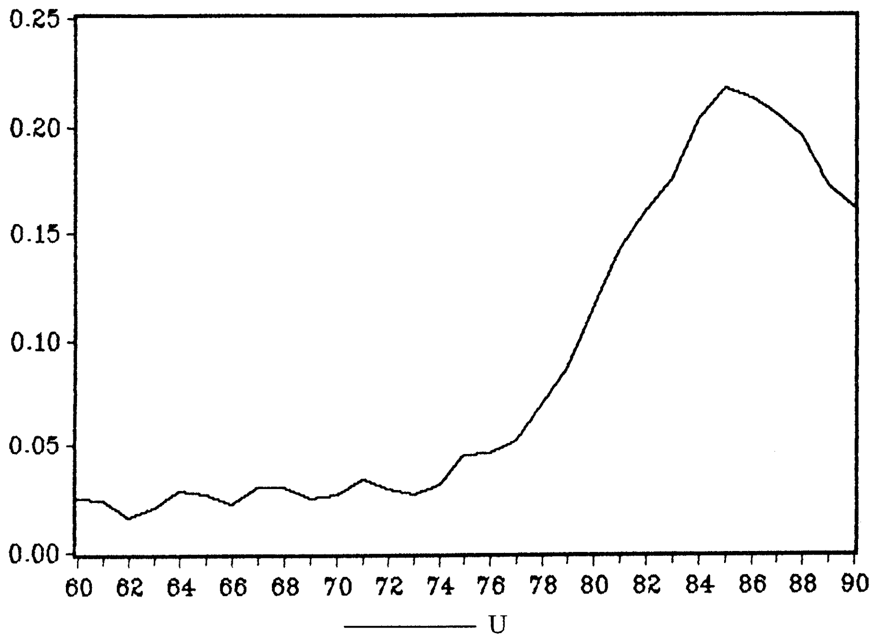


FIGURE 4

a) Spanish Unemployment Rate. (1960-1991)



b) Spanish Unemployment Rate. (1977-1991)

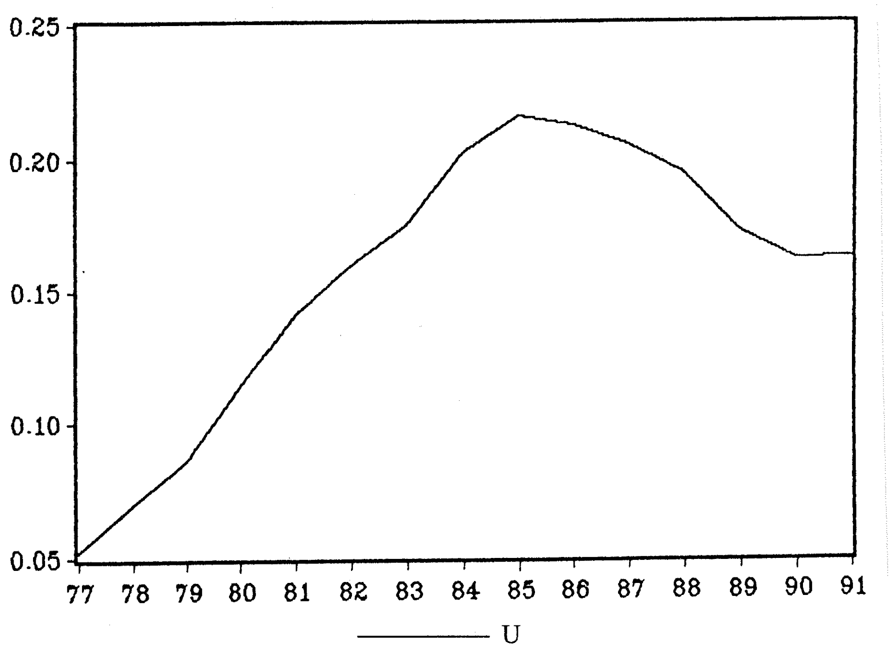


FIGURE 5a
Long Term Unemployment (a year and over)
(as a percentage of total unemployment)

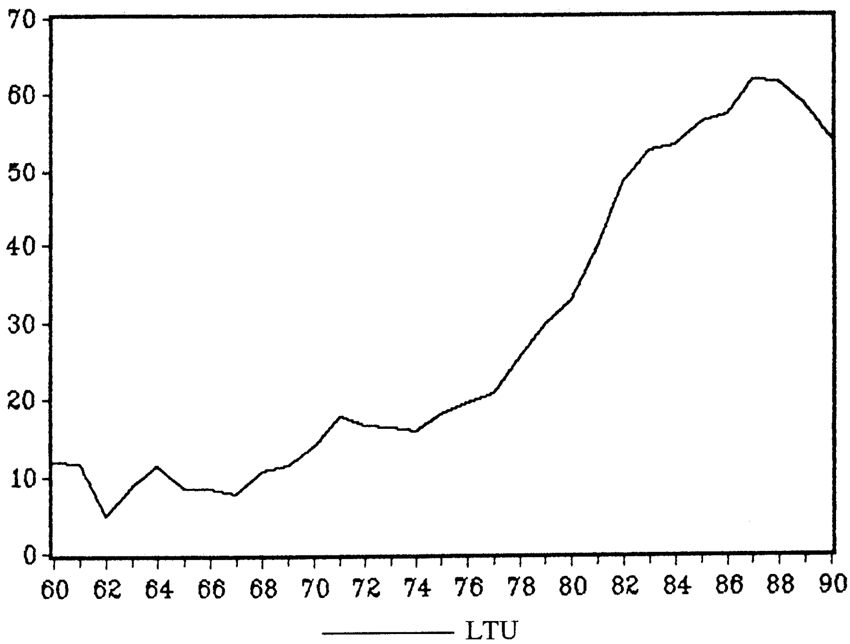


FIGURE 5b
Long Term Unemployment (a year and over)
(as a percentage of total unemployment)

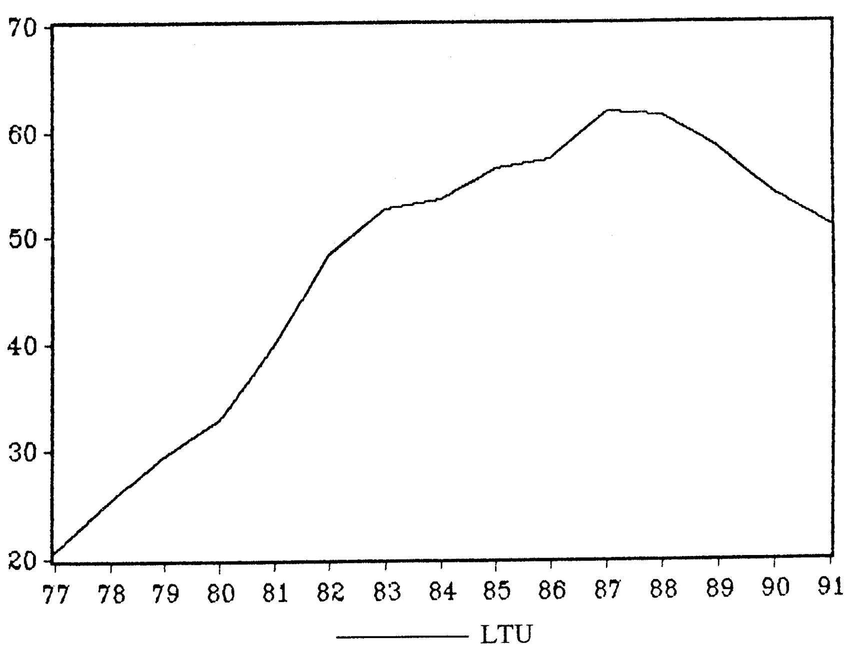


FIGURE 5c

The incidence of Long-Term Unemployment and the unemployment rate

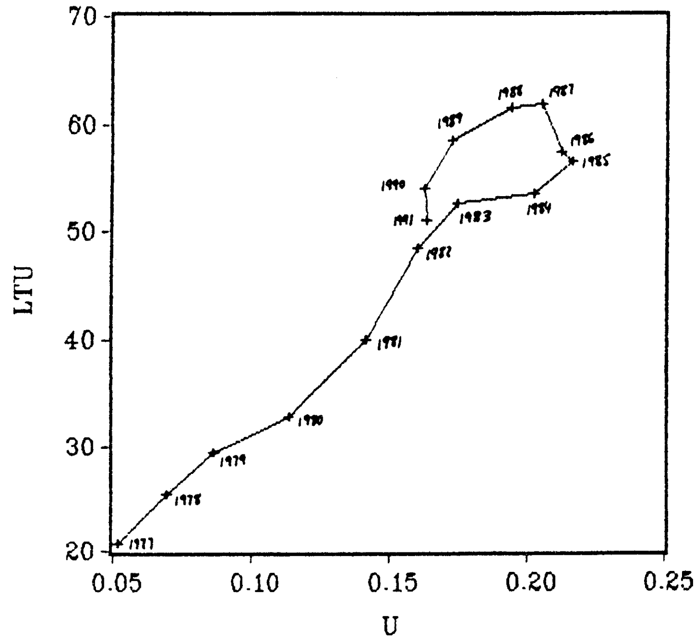


FIGURE 6a

Job Vacants. Unfilled Vacancies (thousands)
Spanish Vacancies

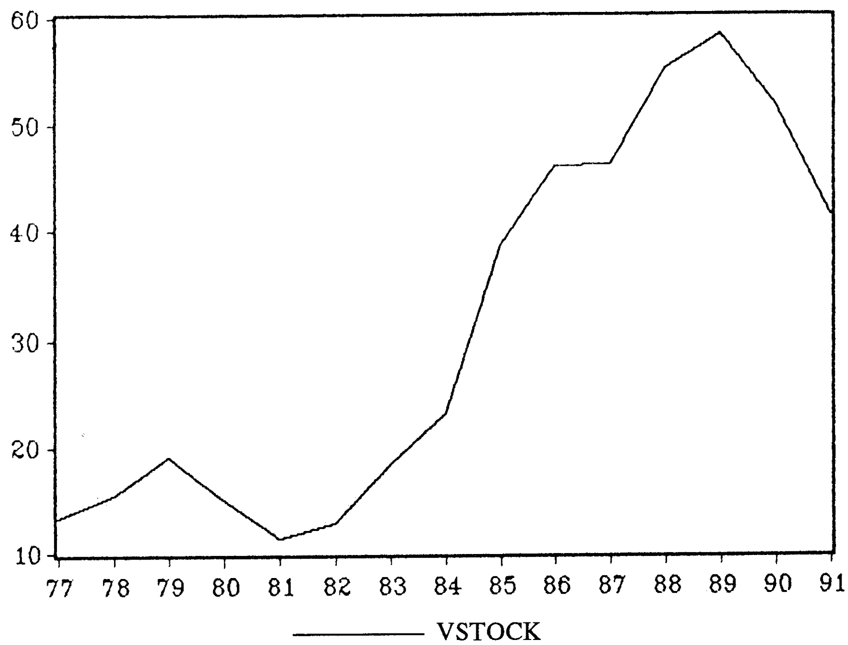


FIGURE 6b

Spanish Vacancies (1977.1-1991.4)

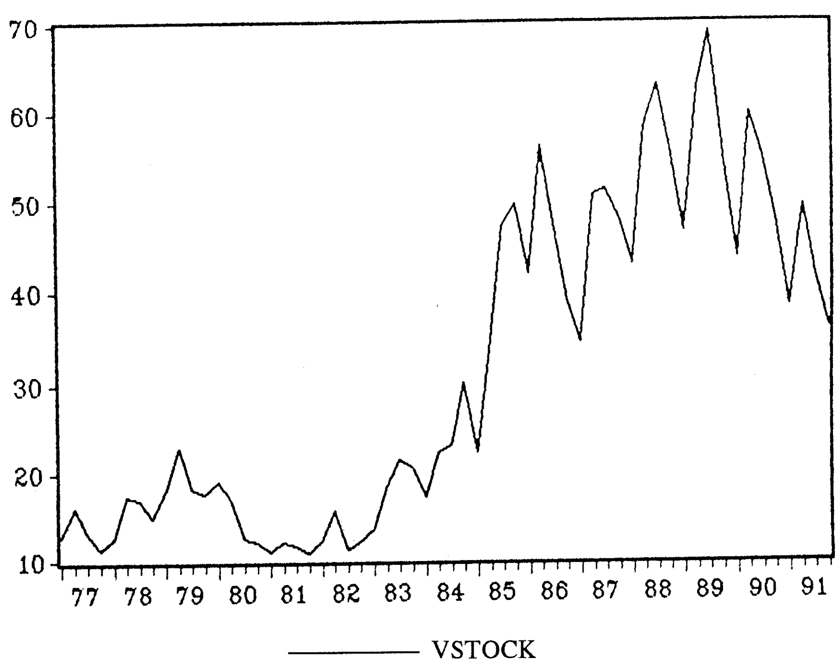


FIGURE 6c
Spanish Vacancies (monthly data)
1977.1-1991.12

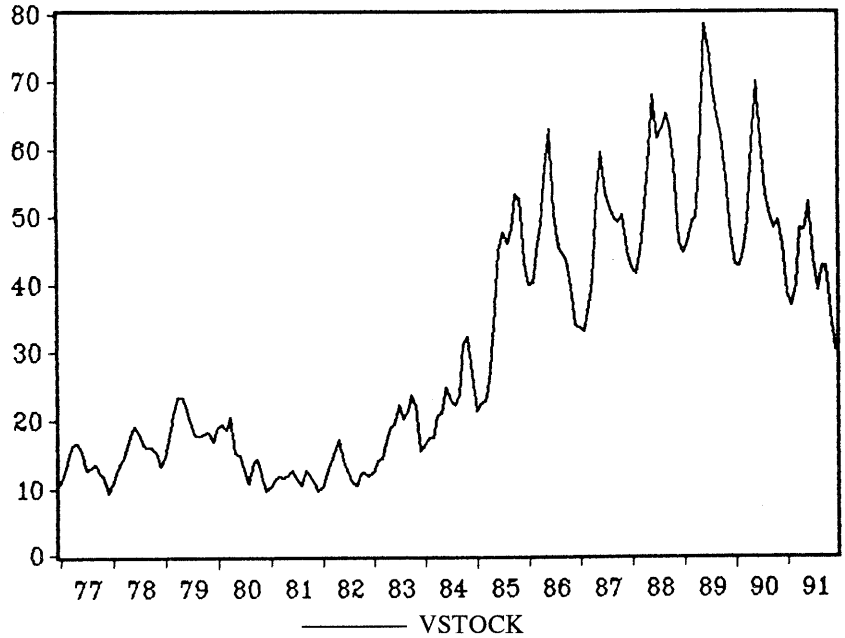


FIGURE 7a
Spanish Vacancy Rate (vacancies/labour force)

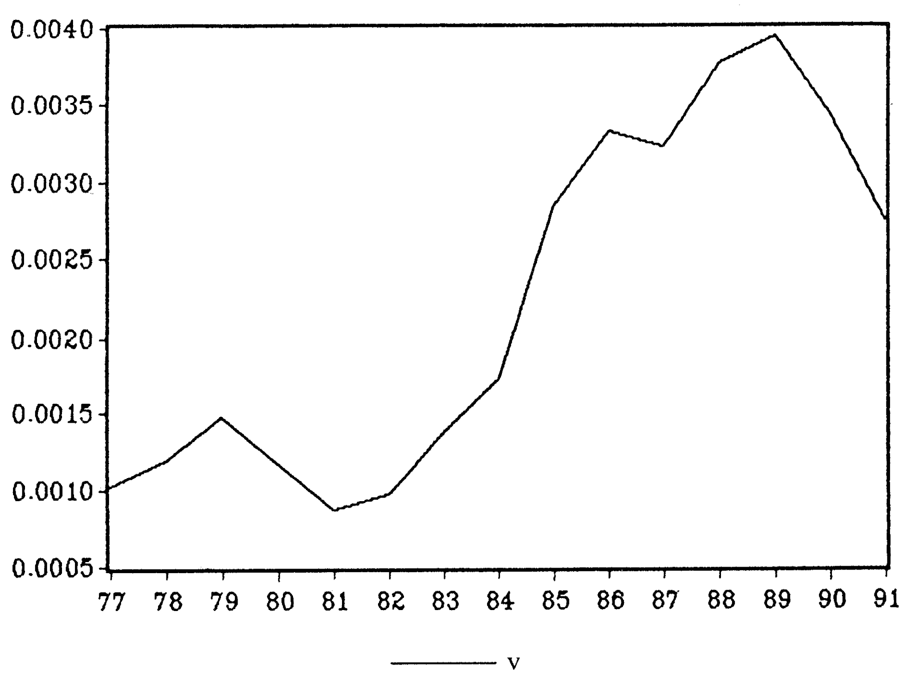


FIGURE 7b

Vacancy rate, v, and corrected vacancy rates with k=0.1, cv1rate, k=0.2, cv2rate, k0.3, cv3rate

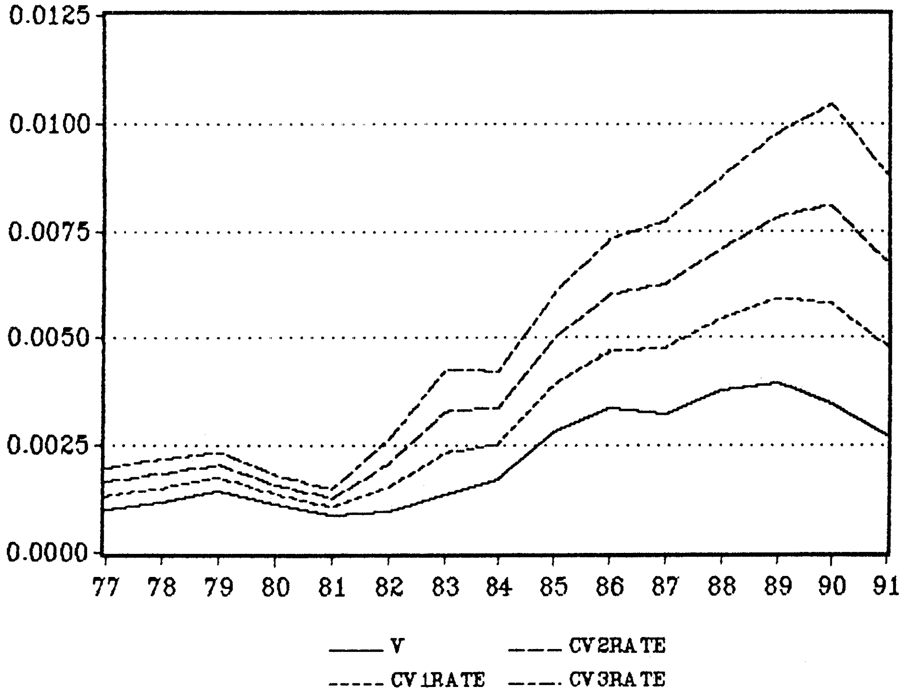


FIGURE 7c

Corrected Vacancy Rates for k=0.3., cv3rate, k=0.7, cv7rate, k=1, cvrate

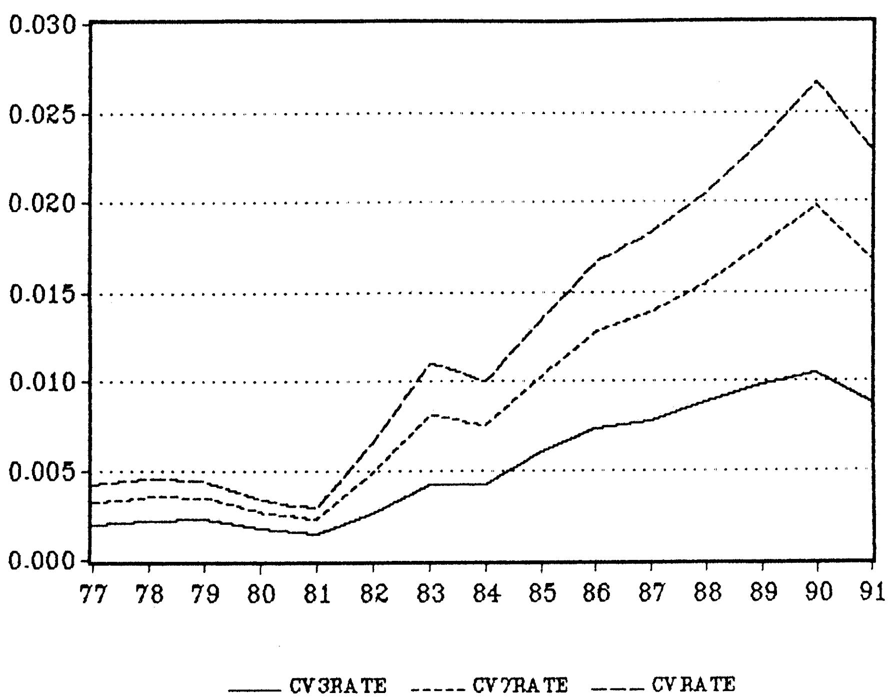


FIGURE 8a
Spanish U-V Curve (1977-1991)

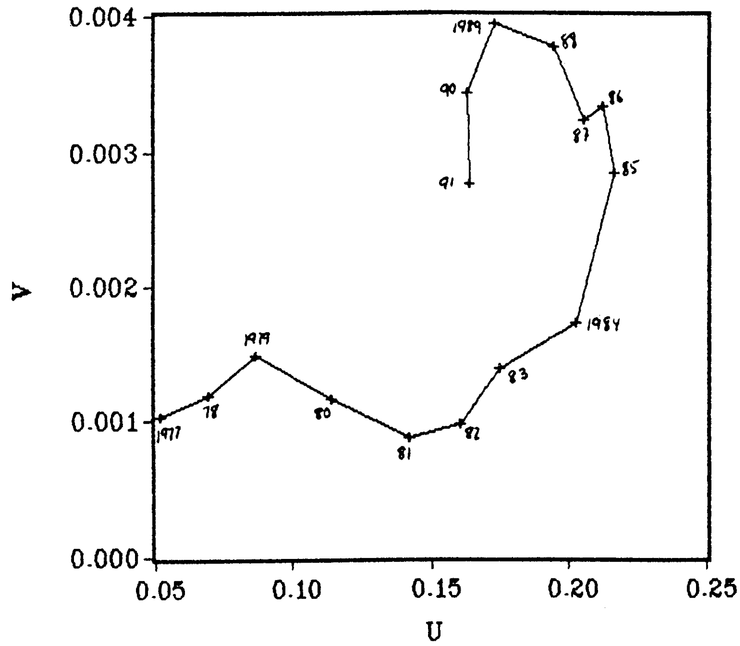


FIGURE 8b
U-V Curve with correction factor. k=0.1

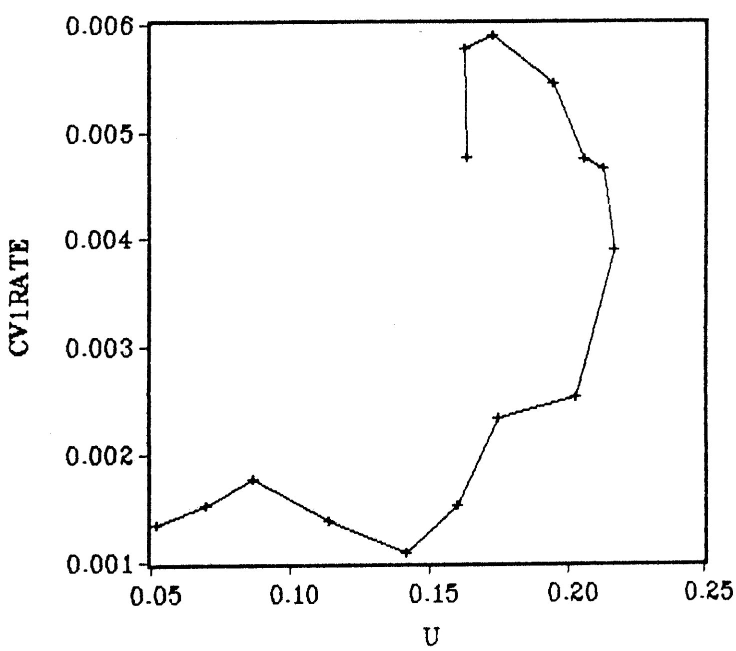


FIGURE 8c

U-V Curve with correction factor. k=0.2

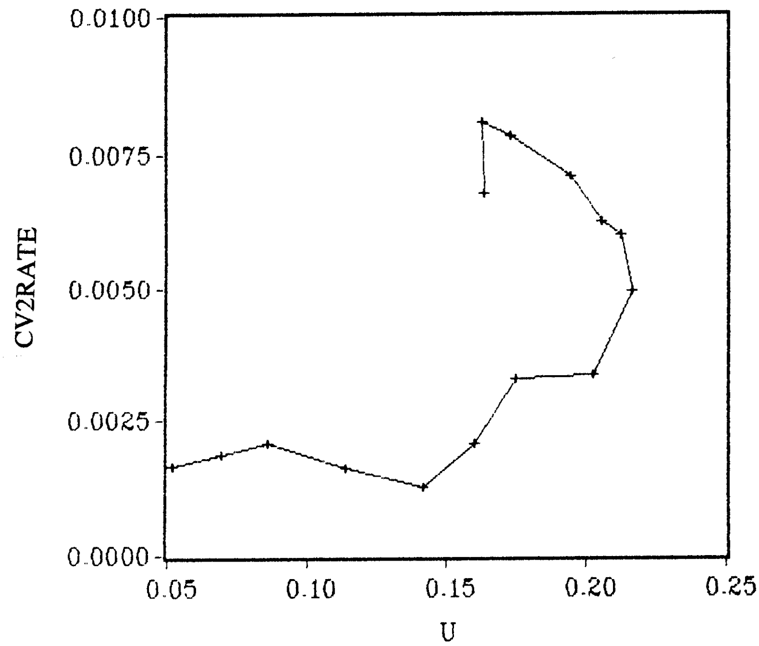


FIGURE 8d

U-V Curve with correction factor. k=0.3

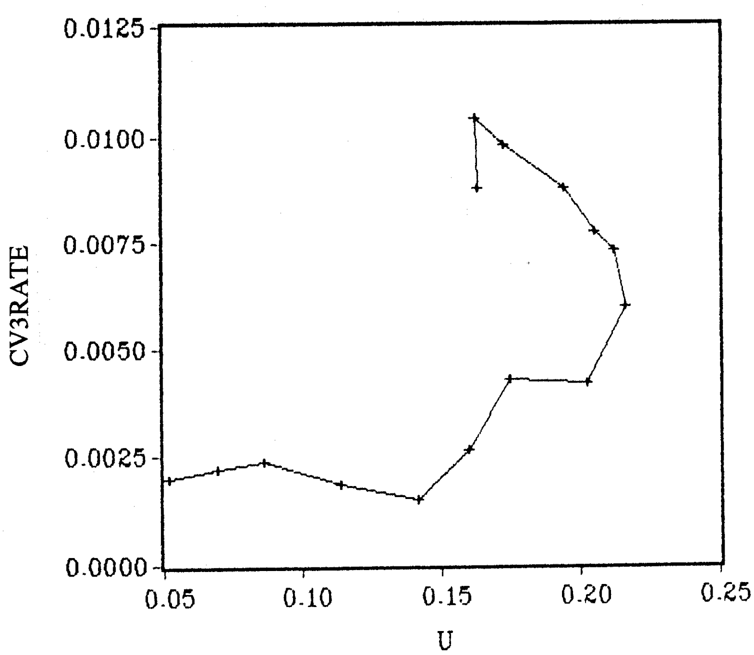


FIGURE 8e

U-V Curve with correction factor. k=0.7

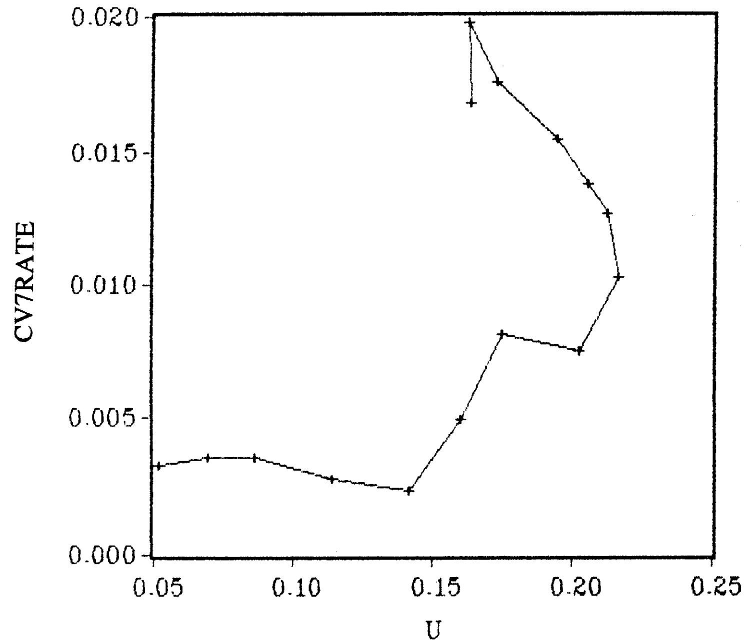


FIGURE 8f

U-V Curve with correction factor. k=1

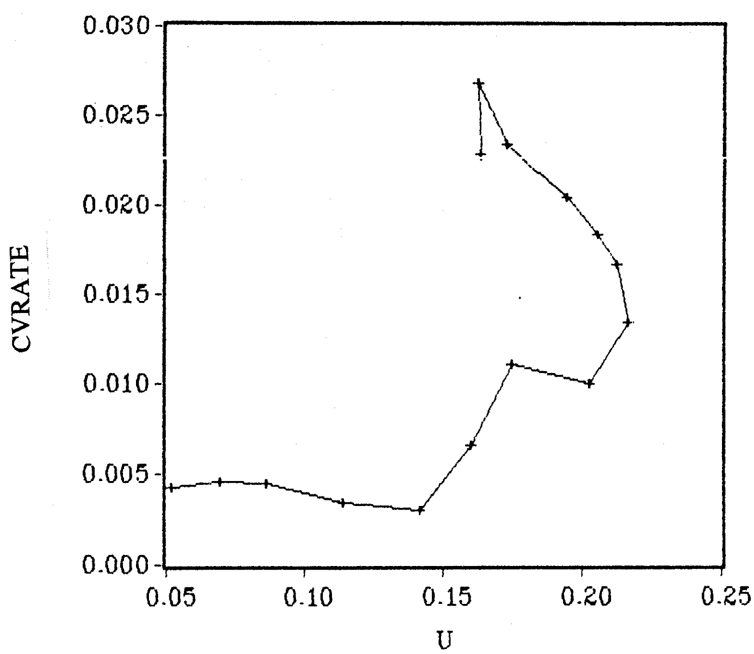


FIGURE 9

Vacancy 'duration' and Unemployment 'duration' (1977-1991)

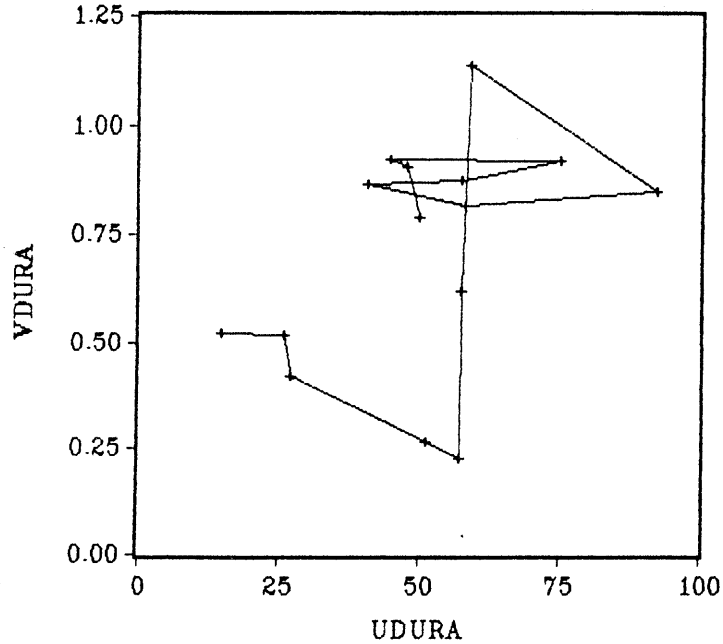


FIGURE 10

Labour Market Tightness (ratio of vacancies to unemployment)

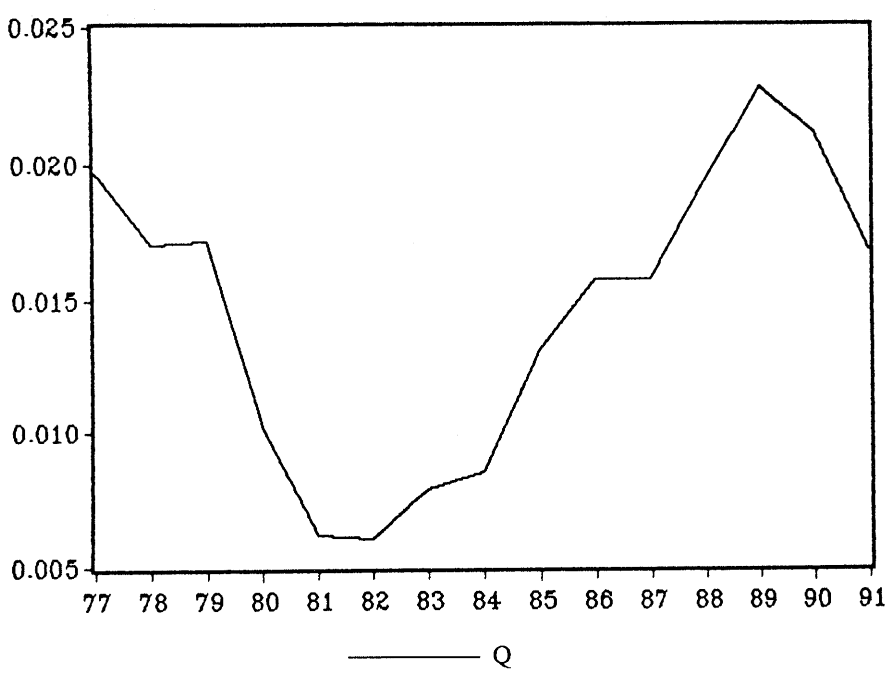


FIGURE 11

a) Un-named Outflows

b) Named Outflows

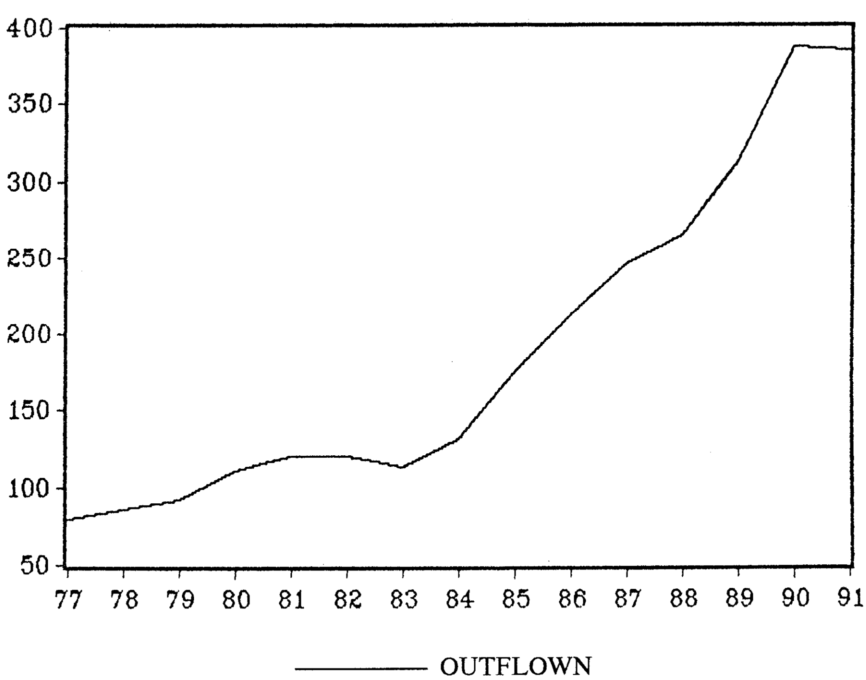


FIGURE 11c

Rate of Named to Un-named Outflows

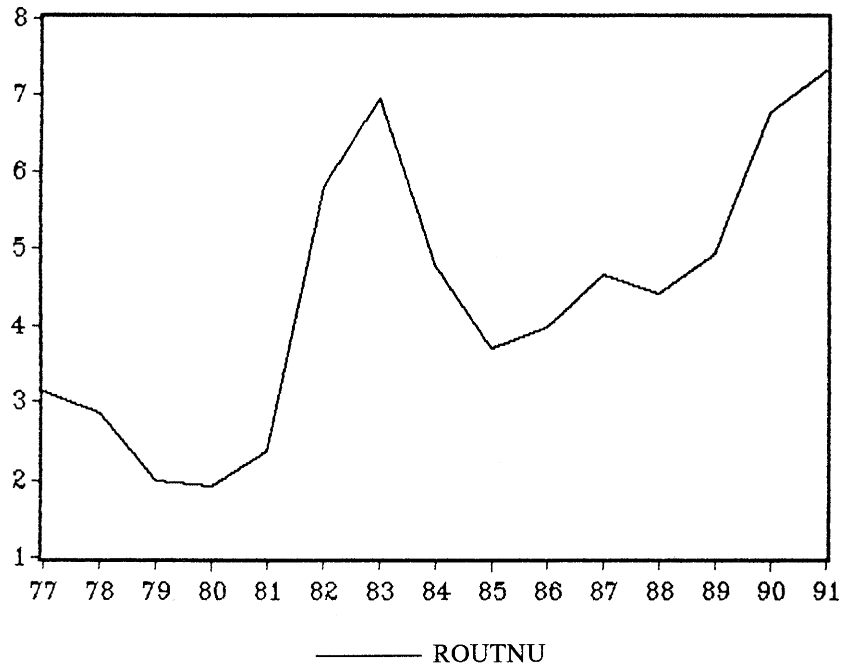
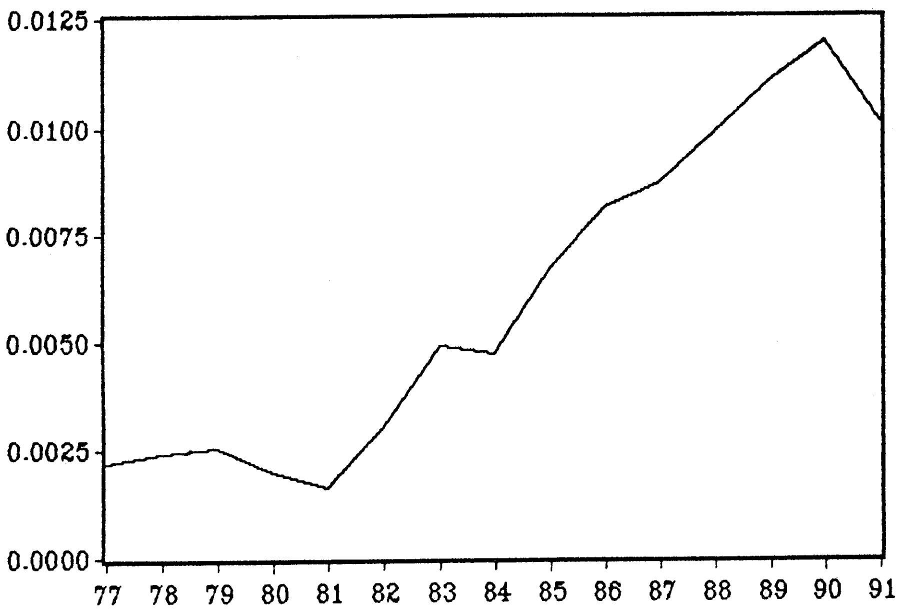
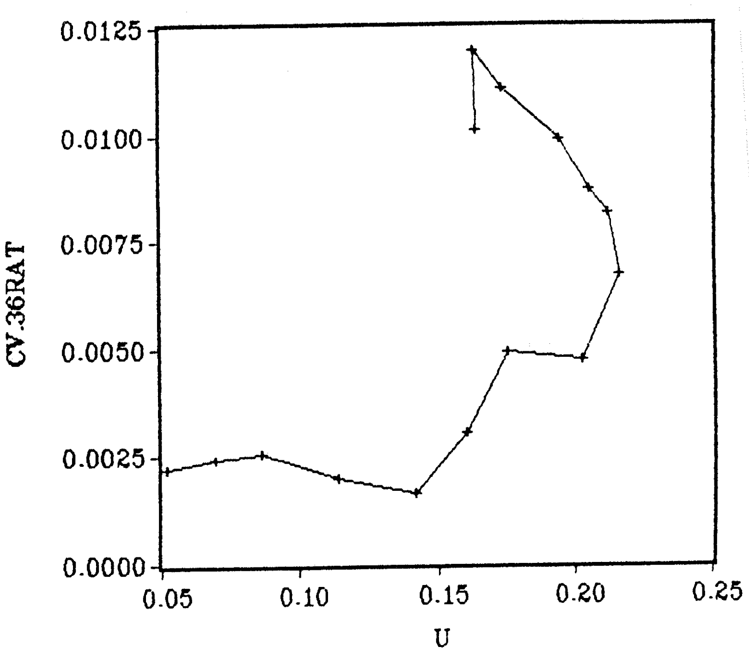


FIGURE 12

a) Corrected Vacancy Rate. k=0.366



b) Corrected U-V Curve. k=0.366



Appendix B: Data Sources and Definitions.

Vacancies. Source: "Estadistica de Empleo", "Instituto Nacional de Empleo (INEM)". They are annual averages of monthly administrative data on the job vacancies as notified to the Public Employment Service (PES: INEM).

The stock of vacancies is the number of unfilled vacancies at the end of the month which are registered with employment offices. Vacancy inflows correspond to all registered firms' job offers (no named job offers), and vacancy outflows are the sum of engagements registered at employment offices plus job offers removed (withdrawals). Duration is computed as the ratio of the vacancy stock to outflows. The vacancy rate is calculated as the ratio of job vacancies to the labour force.

The total outflow is the total number of job engagements plus job offer withdrawals registered with the INEM. This comprises named engagements (named outflows, OUT^n) and un–named engagements, plus job offer withdrawals (un–named outflows, OUT^u).

Unemployment and employment. Source: "Encuesta de la Poblacion Activa (EPA)" and "Series Revisadas EPA (1977–1987), "Instituto Nacional de Estadistica, INE."

The flow into unemployment is calculated as the product of the annual average of the number of unemployed by the percentage of unemployed who have been unemployed for less than one month. The flow out of unemployment is estimated as the difference between the average monthly level of inflows and the average monthly change in unemployment over one year. We use the definition from the OECD, Employment Outlook, July 1990.

The separation rate, s, is the ratio of the flows into unemployment to employment. The unemployment outflow rate or exit rate, uorate, is the ratio of the flows from unemployment to unemployment.

We also use the labour force growth rate, n; the labour force growth rate of young people, lf1624gr; the growth rate of the variable, working age population minus employment before, gwapeb; the proportion of people unemployed a year or more in the unemployment pool, ltu.

Mismatch (mm) is measured as the absolute change in the proportion of employment across sectors. That is, mm= $(1/2)\Sigma|\Delta(N_i/N)|$ where N is employment and i stands for agriculture, industry, construction, and services.

The replacement ratio, rr, is the ratio of monthly unemployment benefits per person entitled to them ("Estadistica de Empleo" INEM, and "Contabilidad Nacional", INE), to the monthly wage net of social contributions ("Contabilidad Nacional" and "Anuario Estadistico", INE).

Instrumental variables. A measure of productivity, prod. It is the real output per person employed smoothed out by removing cyclical fluctuations. We regress the log of the real output per head index number on constant, time trend, cubic time trend, and 5 year MA. We then remove the residuals from the log and we have prod. Budget deficit as a proportion of GDP, bdpgdp. A measure of competitiveness, le. It is log of E, where E is the effective real exchange rate. E is the product of the pta exchange rate (ptas per dollar) multiplied by the world unit price of exports and divided by the producer price index.

Dummies. Shift: time trend from 1977 to 1984, and from 1985 onwards is constant. DL8084: 1 from 1980 to 1984 (LBE) and 0 otherwise. DL8588: 1 from 1985 to 1988 (LPD) and 0 otherwise. DL8991: 1 from 1989 to 1991 (L3/89) and 0 otherwise.

References.

Andres, J., Dolado, J., Sebastian, M. and Zabalza, A. (1990) "The Influence of Demand and Capital Constraints on Spanish Unemployment". In J. Bean and C. Dreze, eds., *Europe's Unemployment Problem*, MIT Press.

Antolin (1993). "Job Search Behaviour: The Probability of Searching for a Job and Job Search Effort using Pooled Cross–Sectional Data". Mimeo (forthcoming IVIE D.T.).

Bentolila, S. and Blanchard, O. (1990). "Spanish Unemployment", *Economic Policy*, April.

Bentolila, S. and Dolado, J.J. (1990). "Mismatch and Internal Migration in Spain, 1962–86". In Padoa–Schioppa (ed.), 182–234.

Bentolila, S. Segura, J. and Toharia, L. (1991). "La Contratacion Temporal en Espana". CEMFI Working Paper No.9111.

Bentolila, S. and Saint–Paul, G. (1992). "The Macroeconomic Impact of Flexible Labor Contracts, with an Application to Spain" *European Economic Review*, 36, 1013–1053.

Blanchard, O.J. and Diamond, P.A. (1989). "The Beveridge Curve". *Brookings Papers on Economic Activity*, 1, 1–60.

Budd, A., Levine, P. and Smith, P. (1988). "Unemployment, Vacancies and the Long Term Unemployed". *Economic Journal*, 98, 1071–91.

Burgess, S.M. (1992a). "Matching Unemployment Dynamics in a Model of Competion between Employed and Unemployed Job Searchers". LSE/CEP Working Paper No. 70.

Burgess, S.M. (1992b). "The Flow into Unemployment in Britain". *The Economic Journal*, 102, 888–95.

Burgess, S. (1993). "A Model of Competition Between Unemployed and Employed Job Searchers: An Application to Unemployment Outflow Rate in Britain". *Economic Journal*, 103 (September), 1190–1204.

De Lamo, A.R. and Dolado, J.J. (1991). "Un modelo del Mercado de Trabajo y la Restriccion de Oferta en la Economia Espanola". Banco de Espana, WP. 9116.

Dolado, J.J., Malo de Molina, J.L. and Zabalza, A. (1986). "Spanish Industrial Unemployment: Some Explanatory Factors". *Economica*, 53: S313–S334. Also in C. Bean, R. Layard and S. Nickell, eds., *The Rise* in *Unemployment*, Blackwells.

Jackman, R., Layard, R. and Pissarides, C.A. (1989). "On Vacancies". *Oxford Bulletin of Economics and Statistics*, 51(4), 377–94.

Layard, R. and Nickell, S. (1986). "Unemployment in Britain". *Economica*, 53, S121–S169.

Padoa–Schioppa, F. (1991). *Mismatch and Labour Mobility.* Cambridge University Press.

Pissarides, C.A. (1986). "Unemployment and Vacancies in Britain". *Economic Policy*, no.3, 499–559.

Pissarides, C.A. (1990). *Equilibrium Unemployment Theory.* Oxford: Basil Blackwell.

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