ANALYSIS OF INTERREGIONAL LABOR MIGRATION IN SPAIN USING GROSS FLOWS[*]

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WP-AD 99-24

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ABSTRACT

This paper studies the economic determinants, from an aggregate perspective, of Spanish interregional labor force flows. Its main characteristics are that it is based on a matching model of the labor market applied to migration, and that uses gross flows instead of net ones as other studies do. Among the main results, we get that unemployment increases out-migration because unemployed people search more actively, but when the unemployment rate is above certain level, this effect is reduced. We also get that wages are a significant variable with the expected sign when entered as the rate of change of relative wages.

Key words: Interregional migration, regional labor markets, matching

JEL Classification indexes: J61; R12

1. INTRODUCTION

It has been a common argument across the different theories of migration that the flow of workers from one region to another can play an important role in helping to solve the problem of regional structural imbalances in the labor market. In this respect, workers would take advantage of the existence of regional differences in the labor market and move to the region where they consider they can obtain the best returns to their human capital. Accordingly, unemployed workers should go to those regions with, other things equal, lower unemployment rates, as it would lead to an increase in their chances of getting a job, assuming unemployment rate is a good measure of these chances. This is the case in the Harris-Todaro (1970) labor-flow model, in which regional wages are weighted by the respective probability of employment, measured by one minus the unemployment rate.

Migration can be viewed as a consequence, at least to some extent, of the differences in the performance of the labor market at a regional level. At the same time, migration should act to correct those differences by, for example, bringing closer regional unemployment rates. However, a number of countries have experienced some persistence in structural imbalances among the various regions (Layard, Nickell and Jackman, 1991). This fact casts some doubts about the ability of migration to overcome those imbalances.

Spain is one of those countries where the differences between the regions have been, and still are, really persistent over time. On this topic, absolute unemployment rate differences have been increasing over time, as the overall unemployment rate was also increasing. In order to be more precise on this point we have worked out two regional unemployment inequality indices. Both of them are shown in Figure 1. The first one refers to the sum of the absolute differences in unemployment rates across regions, weighted by their labor force share; and it is clear that it has been increasing over most of the period under analysis. However, the other index, which is related to the sum of the relative unemployment rates, also weighted by the labor force share, shows a tendency towards a greater regional similarity in this respect.

Despite this increase in the absolute differences among regional unemployment rates, as a sign of persistent structural imbalances, the interregional migration rate has been decreasing since 1964, with some exceptions, going from over 2.3% that year to just under 1% in 1983. After that year it went up again until 1989 to fall down again later (Figure 2). As a first approach, these two facts could be somehow reconciled taking into account the evolution of the unemployment rate for Spain as a whole. As Figure 3 shows, the unemployment rate was relatively low during the 60's, marginally over 1%. In the early 70's it started to increase slightly, becoming much sharper from 1975 onwards, reaching really high levels during the 80's (21.5% in 1985) and through the 90's. The regional unemployment rates moved in a similar fashion to the national one. It could explain, to some extent, the fall in the migration rates as depressed general economic conditions, of which higher unemployment rates are a clear sign, will lead to people being less likely to move. Along this line, Pissarides and Wadsworth (1989) and also Pissarides and McMaster (1990), both for

## Figure 1: Unemployment Inequality Index
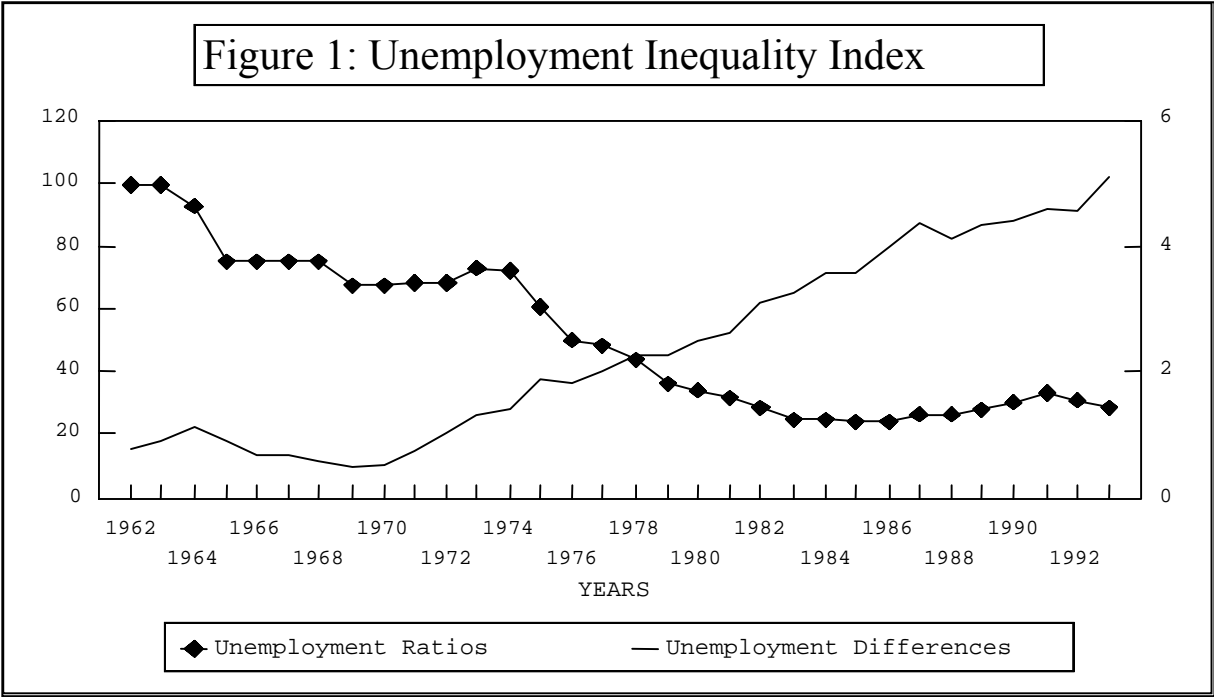
Notes:

(a) The inequality index for the relative unemployment rates is measured along the Y-axis on the left. It has

been calculated according to

$$100 \left[\sum_i \frac{L_i}{L} \left(\ln \frac{u_i}{u} \right)^2 \right]^{1/2}$$

(b) The inequality index for the absolute difference in unemployment rates is measured along the Y-axis on

the right. It has been calculated as

$$\sum_i \frac{L_i}{L} \, |u_i - u|$$

Figure 2: Interregional Migration Rate
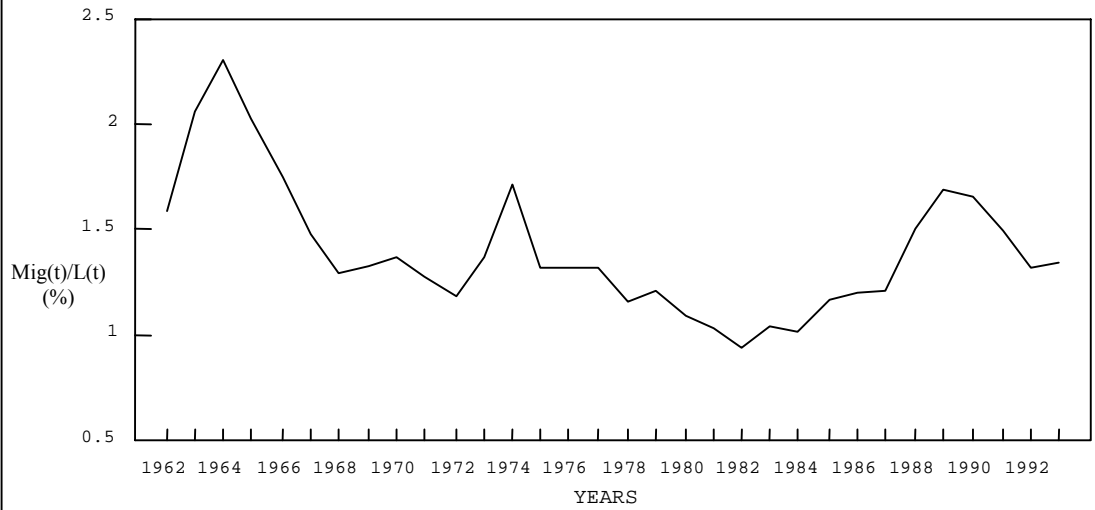
the U.K., among others, indicate that they affect the net gains from migration. In this respect, they assert that higher unemployment goes together with longer spells of unemployment, in which case the marginal cost of moving is higher. On the other hand, following also the human capital approach to migration theory, the returns to the decision to migrate will be subject to a greater variance as unemployment rises, because the final outcome of migration will involve a higher degree of insecurity. Therefore, it seems clear that, in the presence of risk-averse individuals, high unemployment rates will deter migration.

Apart from unemployment rates, the performance of the labor markets is also measured in term of wages. Differences in regional wages are also likely to affect the behavior of migration. These differences not only reflect the existence of differences between regions, but they also indicate the presence of rents in certain regions that might be appropriated by individuals migrating from other regions. Accordingly, small differences in regional earnings would mean lower pecuniary incentives for people to migrate. The available data for Spain give the impression that something of this kind might have happened. As Figure 4 shows clearly, the coefficient of variation across regions of average nominal wages has been falling continuously since 1968 (real wages behave in a similar fashion). It shows a tendency towards a higher degree of homogenization in the behavior of the nominal wages across Spanish regions, reflecting the fact that during the last years of the 70's and part of the 80's a new system of nation-wide wage agreements became common practice, with the legalization of Trade Unions.

The present paper is an attempt to shed some light on the economic variables, together with the sign of their effect, that influence migration, in the case of Spain. In particular, it is important to identify these determinants as that will help to explain the question of why migration flows fall precisely when unemployment in Spain is increasing, and these flows could help to reduce it by reducing interregional disparities and bringing closer the regional unemployment rates. There are other works on the topic of interregional migration in Spain analyzed from an economic point of view. The closer ones to the present paper are those by Santillana (1978), Bentolila and Dolado (1991) Antolín and Bover (1993), amongst others. However, we think that this research provides a new approach to the question of interregional migration in Spain, as it addresses this question from a different angle. Instead of aggregating gross flows into net ones and then study the determinants of these net migration rates, we will make use of the gross flows data themselves. Equally, we will pay less attention to the dynamic aspects of migration so as to concentrate mainly on the sign and significance of the labor market variables that will turn out to determine the internal migration flows of the labor force.

According to the approach adopted here, migration is a consequence of the process of job-search and hiring when unemployment and vacancies from various regions within the same country take place simultaneously. In contrast, traditional human capital based theories view it as an investment decision by which people consider that they will be more likely to be successful in their search for improvement in their standard of living by changing the place of residence, which could include, among other things, the search for a job. Therefore, the present theoretical framework concentrates specifically on "contracted

migration", i.e. migration which takes place once an opportunity has been offered in a region different to that of the present residence, as opposed to "speculative migration", which considers movements without the explicit modeling of employment opportunities (Silvers, 1977).

In this paper we will try to check how well this theory of migration, based on job-hiring, fits the Spanish data and we will see how it leads to different interpretations of results that seem similar to those of other studies. We will start in Section 2 by doing some comments on the structure of the model used for this study, together with some reflections on the characteristics of the endogenous and exogenous variables of the model. Then, Section 3 reports on the results obtained, especially about the signs and significance of the coefficients on the main variables of interest when the equation obtained previously is applied to the Spanish data. The period covered by the analysis is fairly long, as it expands for over 30 years, including important changes in the economic and political life of Spain. Therefore, one should expect some kind of structural change in the equation estimated. Thus, in this section we have also included an analysis of the presence of structural changes in the response to the economic incentives to migrate. The last section of the paper, Section 4, contains the main conclusions of the analysis carried out here.

2. DESCRIPTION OF THE MODEL AND VARIABLES

The actual equation to be estimated is obtained following the job-matching theoretical framework developed, and examined using data for Great Britain, by Jackman and Savouri (1991). They consider migration as a particular case of hiring. Thus M_{ij}, which is the number of people moving from region i to j, can also be considered as the number of job seekers in region i taking up vacancies in region j. Consequently, migration is a function of unemployment and vacancies. This function is in fact the aggregate hiring function, which is subject to constant returns to scale. This is the way the total number of engagements (aggregate hiring) enters the interregional migration function. The second stage in the development of the model consists in the introduction of distance in the equation. They argue that, ceteris paribus, people will be more likely to accept a job that is offered in their own region, as they prefer, in general, to work where they are domiciled. They introduce this distance as a discounting factor. This effect leads them to think that unemployment rate in the region of destination and the vacancy rate in the region of origin should be in the migration function.

The next step is the introduction of the other differences between regions. The most important one is wages, where the relevant variable is relative real wages. However, its effect in the migration equation is not clear. In general, the number of applicants to a certain vacancy will increase with the wage offered. But, at least to a first approximation, it does not mean that the probability of a vacancy in region j being filled by a person from region i will be increased. The only possibility of having a positive relationship between the number of engagements and relative wages is that it implied a quicker filling of the vacancy and a lower probability of a certain vacancy being left unfilled. However, in support of this possibility we must add that

higher wages will not only attract a higher number of job applicants, but it will also shift the relative search effort of those applicants, searching more intensively those vacancies associated with higher wages.

Another economic factor they take into account is housing tenure. However, there is an important difference between Spain and the U.K. It lies in the fact that there is not a housing market policy by the Spanish local councils, generally speaking.

They also consider the problem of the level of overall engagements that appears in the hiring function. Due to the lack of data, and after some testing, they use total migration as a proxy for engagements.

Basically, this is the starting point for the equation that Jackman and Savouri (1992) have estimated for the U.K. The equation that has been estimated for Spain is essentially the same, although with slight changes. We have tried various specifications with different functional forms for the variables, but the preferred one, for reasons explained along the paper, is the following:

(1)
$$Ln\left(\frac{Mij}{Li}\right) = \alpha_0 + \alpha_1 u_i + \alpha_2 u_i^2 + \alpha_3 u_j + \alpha_4 \ln\left(\frac{w_i}{w_j}\right) + \alpha_5 \Delta \ln\left(\frac{w_i}{w_j}\right) + $$
$$+ \alpha_6 \ln\left(\frac{p_i}{p_j}\right) + \alpha_7 \dot{n}_i + \alpha_{87} \dot{n}_j + \alpha_9 \ln\left(\frac{M}{L}\right) + \alpha_{10} Year$$

The dependent variable for this study is the migration rate between any two regions M_{ij}/L_i (in logarithmic form). M_{ij} is the number of migrants between any two Autonomous Communities, or regions, within Spain, where i refers to the origin region and j to the region where people go to. L_i is the labor force in region i. The interregional migration flow matrices (M_{ij}) are obtained from the Spanish national statistics office, I.N.E., and they refer to population, both active and non-active, who have changed their place of residence. Consequently, this excludes from the migration flows all those temporary moves that do not imply a change of permanent residence. This means that the data seems particularly fit to analyze "contracted migration", rather than "speculative" one. Therefore, the results should be interpreted in terms of contracted migration. On the other hand, the information provided by the I.N.E. and used here is not restricted to labor force movements, but rather includes anyone who changes their place of residence, irrespective of their status with respect to the labor market[1].

The use of gross flows is an important difference of the present study from most of the studies on Spanish migrations. Bentolila and Dolado (1991), for example, use as the dependent variable the net immigration rate, arguing that the flow of migrants between regions in Spain during the period considered is

quite unidirectional so that it would not make much of a difference whether gross and net migration equations are estimated. However, our opinion is that by using gross flows, we should be able to capture certain peculiarities of the data. In this respect, Jun and Chang (1986) also indicate that the use of net migration implies the loss of some information included in gross values but not in net values. Frees (1992) goes a bit further and says, "it is generally accepted that modeling net migration can be misleading".

Let us move now to the right hand side of equation 1. Following Pissarides and McMaster (1990) and others, we have included a set of dummy variables, one for each origin-destination flow, which means a dummy for each possible pair of regions (F_{ij}). In the case of bilateral flows, as we have here, this one is probably a more adequate procedure. Thus, we have 16x17 origin-destination dummies. These dummy variables also include all those effects that might affect the migration flows and that remain practically unchanged. In particular, they could well serve as an appropriate way to pick up the effect on migration of certain location-specific amenities, such as climate or other geographical aspects that could characterize a region, like those mentioned by Cushing (1986). However, with this set of origin-destination dummies we cannot include distance as a regressor because we would have then two explanatory variables that remain constant for each bilateral flow, i.e. for each observation of the endogenous variable. Therefore, in order to evaluate the importance of the distance between regions as an element that affects the migration process, we have to use a different set of dummies. In this case the procedure consists of a specification of a dummy variable for each of the origin and another one for each of the destination regions (F_i and F_j). It means that two dummies characterize each flow, with the peculiarity that all flows proceeding from the same region will share the same origin dummy variable. Both sets of dummies have similar effects on the regression. However, once the effect of distance is assessed, we have chosen the F_{ij} dummies, dropping the variable distance from the model to avoid perfect multicollinearity.

The first economic variables[2] that appear on the right hand side of equation 1 are regional unemployment rates in the regions of origin (u_i) and destination (u_j), both of them expressed in percentages. Regional unemployment rates perform, in general, much like the national unemployment rate, reported in Figure 3. Most of the regions have high unemployment rates and also high out-migration rates, especially during the first years reported. According to the Jackman-Savouri model, we should expect a positive coefficient on the unemployment rate of the region of origin and a negative one on the rate of the region of destination. In our case, we have tried various specifications for the functional form of the unemployment rates and it turned out that the squared of the rate of the region of origin had to be included.

Figure 3: Spanish Unemployment Rate
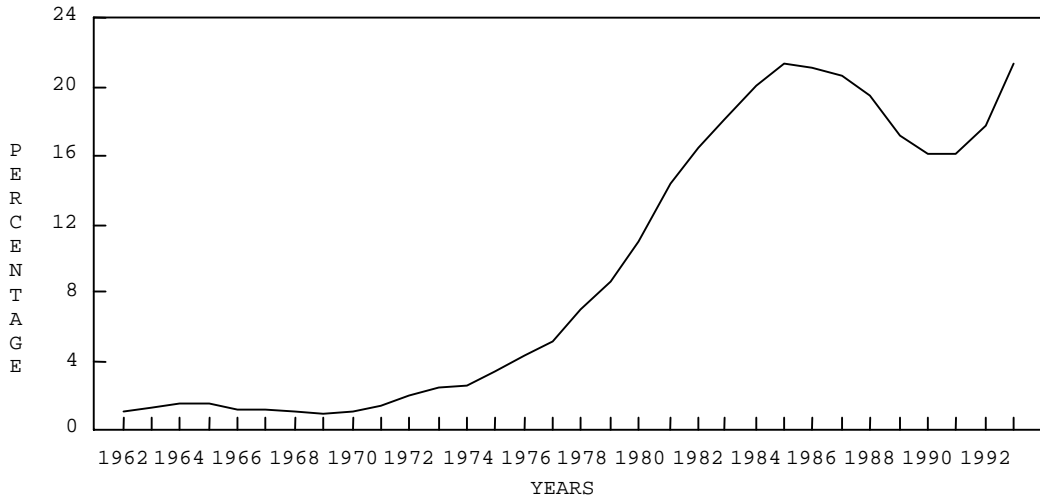
Next economic variables are regional wages[3]: w_i and w_j. The functional form is the one indicated by the Jackman-Savouri model: the logarithm of the wage of the region of origin divided by the wage of the region of destination. These are nominal wages and as it was indicated earlier, nominal wages across regions have converged over time (Figure 4). As there is no direct information on wages for the whole period, they have been obtained by dividing the total nominal employees' compensation in the region by the number of wage earners in that region. Apart from including these relative regional wages contemporaneously with the dependent variable, we have also included as a regressor the change between the previous and the contemporaneous period in this variable, as people could consider the evolution of regional wages as an important source of information about the future.

The Consumer Price Index for each region would allow quite easily the translation of these nominal wages into real values. Nevertheless, it has been a preferred option the introduction of prices separately testing for the significance of each of these two variables on their own. Regional prices[4] were introduced with the same functional form as nominal wages.

The following two economic variables in equation 1 ($\dot{n}_i$ and $\dot{n}_j$) represent the employment growth rates in the regions of origin and destination respectively, also expressed in percentages. Originally, the economic variable that should be included in the model is vacancies. Regrettably in the case of Spain there are no data for this variable over the sample period used here. In its place, we have used regional employment growth rates as a proxy for regional labor demand. This procedure was also used by Jun and Chang (1986). The model they put to test is a simultaneous two equations model, one for migration and the other for employment growth, and this latter variable could be picking up the effect of employment opportunities in the area, explaining in this way the lack of significance of the ratio of population to employment in their analysis. In this respect, they find that the employment growth variable is significant, and with a positive sign, in the migration equation; but migration is not significant in the employment growth equation. Therefore, if we take employment growth as a proxy for employment opportunities, it turns out that this is one of the determinants of interstate migration. However, they are unable to prove the hypothesis of employment growth and migration being simultaneously determined. Despite this result by Jun and Chang (1986), we have also tested for the endogeneity of employment growth variables instrumenting them.

The study of the significance of these variables is especially interesting. According to the model used here we should include them together with the regional unemployment rates as these variables measure different economic effects. While the unemployment rate is related to the intensity of search, employment

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3 .   Due to the lack of official data, and following the procedure by Bentolila and Dolado (1991), nominal wages have been calculated as the ratio of total nominal employees' compensation in each region to the number of wage earners in that region.

4 .   The data for this variable has been obtained from the Statistical Yearbook for Spain, published by the Spanish Statistical Office. Following again Bentolila and Dolado (1991), regional price series have been constructed taking the year 1962 as the base year for all regions.

Figure 4: Wage Inequality Index
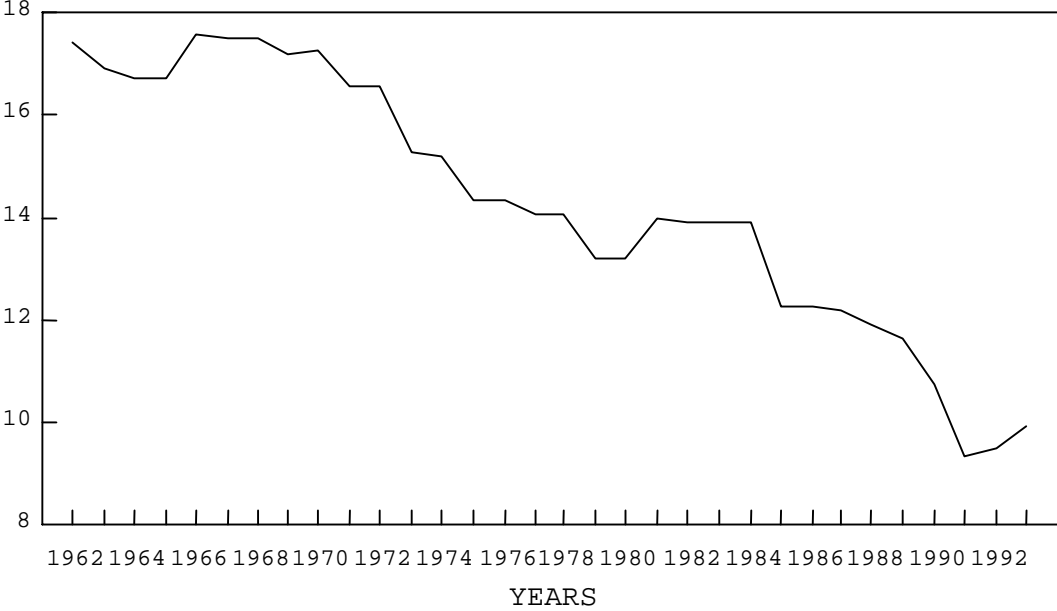
growth measures job opportunities. Therefore, we should expect significant coefficients on all the variables. Turning again to the comparison with the study carried out by Bentolila and Dolado (1991) there is an added interest as they found that relative employment growth was not a significant variable in their analysis.

In fact, one of the problems associated with the use of the area unemployment rate within the framework of the human capital models is linked to its justification as a determinant of migration flows. In most of the analysis carried out, it is used as a proxy for the employment probabilities, or as a measure of the relative economic opportunities in the origin and destination areas. As Fields (1976) notes, potential migrants will regard the area unemployment rate as an imperfect index of the tightness of the regional labor markets, and will prefer to use measures of labor turnover, such as the probabilities of moving from unemployment to employment and the other way around, as a best indication of the employment conditions in these labor markets. In fact, he finds that the new hire rate and the layoff rate are both significant and with the expected signs (i.e. positive and negative, respectively).

Next regressor is the overall migration rate (*M/L*). As it was indicated earlier, Jackman and Savouri (1992) find it to be a good proxy for the total number of engagements and they use it in their regression. We too follow that procedure, as there are no data on engagements in Spain for the whole period considered.

It is clear that some, if not all, of these variables show a trend during the period considered. In order to avoid the possibility that some of the estimated coefficients reflect, at least in part, a common trend with the dependent variable, we have considered explicitly a trend variable (*year*) as another regressor in the equation to estimate. Gordon (1985) also introduces an upward secular trend in mobility as a factor explaining the rate of movement as a reflection of changing levels of education, specialization and other factors associated to higher levels of mobility. We have also included year dummies in order to capture specific macro effects for certain years on migration.

3. EMPIRICAL RESULTS

Effects of distance

There is an important literature about the importance distance has in explaining migration flows, not only in this model based on job-hiring, but also in other place-to-place migration models. Generally speaking, the distance variable is used as a proxy for various determinants of migration, which turn out to be difficult to measure. These are, amongst some others, costs of moving, uncertainty and risk-aversion or quality and quantity of information transferred between regional labor markets. We are particularly interested in checking the two following hypothesis:

1. It is clear that the technology of information has developed faster lately, allowing not only a quicker spread of news, but also easier contacts between any two points apart.

2. Better communications mean lower search costs in a distant place as there will be no need to physically go to a certain region to search for a job.

As indicated earlier, the model used to estimate the migration equation is a fixed effects model with origin (Fi) and destination (Fj) dummies. To assess the significance of distance in the migration equation, we have started the analysis by estimating one cross-section equation for each year from 1963 till 1993 using the origin and destination fixed effects and then adding the distance variable, in logarithmic form, as the only regressors. This will also give us the way the impact of distance on migration has evolved over the years covered by the sample.

Table 1 reports the estimates of the coefficients of the distance variable in column 2, together with the R^2 for the level of significance of the equation for each year in column 3. The last column gives the values of the R^2 of the equations fitted only with the origin and destination fixed effects.

The first thing to note is that the incorporation of distance means a considerable increase in the explanatory power of the equation of the behavior of the dependent variable for every single year. The R^2 goes from an average of 60% to around 78%.

The second point affects the coefficients of the explanatory variable. Firstly, they are highly significant for every year of the sample, with t-statistic values well above, in absolute terms, the critical t-value in each case. Furthermore, they take negative values, as it should be expected according to the assumed discouraging effects of distance implied by the reasons given previously. It means that people are more likely to move, other things equal, to the nearest possible region to fill up a vacancy.

Finally, looking at the evolution over time of the estimated coefficients it can be noticed that they indicate a fall in the size of the effect of distance on the migration rates, as the coefficients are lower, in absolute values, with the years. It means that people find it now less inconvenient to move to a distant place.

In relationship to the two hypotheses put forward previously, the reduction of its coefficient means that distance is now a much less important barrier from the point of view of the transmission of information than a few years ago, as the development of the technology has made possible easier contacts between any two points apart. This will also reduce the costs of carry out some search out of the own region.

TABLE 1: Cross-Section Migration Equations: "Distance" Effect

Dependent Variable: Ln (*Mij/Li*)   No. Observations per Year: 272

Year	Ln(distance in Km.)	R-squared	R-squared (*Fi;Fj*)
1963	-1.64 (-12.21)	74.7	58.4
1964	-1.67 (-12.46)	74.9	58.1
1965	-1.62 (-12.28)	76.2	61.1
1966	-1.55 (-13.04)	77.7	61.8
1967	-1.56 (-12.25)	74.1	57.8
1968	-1.50 (-12.93)	76.3	59.7
1969	-1.49 (-13.28)	77.1	60.0
1970	-1.42 (-12.51)	75.6	59.4
1971	-1.34 (-13.26)	78.4	62.4
1972	-1.32 (-12.36)	75.6	60.0
1973	-1.37 (-13.07)	77.5	61.6
1974	-1.37 (-13.37)	78.4	62.3
1975	-1.33 (-13.18)	77.9	62.0
1976	-1.32 (-14.93)	80.8	63.1
1977	-1.33 (-15.13)	80.4	61.7
1978	-1.27 (-16.10)	81.8	62.1
1979	-1.34 (-15.55)	79.7	59.2
1980	-1.32 (-16.40)	81.0	59.7
1981	-1.28 (-17.65)	82.4	59.6
1982	-1.27 (-16.62)	79.8	56.5
1983	-1.40 (-16.26)	78.5	54.7
1984	-1.48 (-17.74)	82.7	59.6
1985	-1.41 (-15.75)	80.4	59.8
1986	-1.32 (-18.93)	84.0	60.0

Notes:

(a) Equations estimated by Fixed Effects Least Squares, using 16 origin (*Fi*) and 17 (*Fj*) destination dummies, with no constant to avoid perfect multicollinearity. t-statistics in parenthesis.

(b) The R-squared [*Fi; Fj*] refers to the analysis of variance when the origin and destination fixed effects are used on their own.

With respect to the cost of moving, it is clear that only by considering the general improvement over time in the different means of transport, including the conditions of roads, and the reduction in the differences in infrastructures across regions, it is possible to realize that though the distance between any two cities is the same in 1993 as it was in 1963, the costs of going from one to another are now much lower. This is also reflected in the reduction of the coefficient of distance in the migration equation over the years.

Effects of economic variables

Let us examine now the results obtained when introducing the economic variables as regressors. The procedure consists of pooling the cross-section data over the 31 years that covers the sample to estimate the equation by fixed effects least squares.

We now introduce the origin-destination flow set of dummies (*Fij*). Although distance has to be dropped from the regression to avoid perfect multicollinearity, the variance of the dependent variable explained with this set of dummies is greater, and the standard errors associated to the estimation of the coefficients are also smaller giving, as a consequence, larger t-values[5].

In all the specifications that have been tried the trend variable appears to be statistically significant and positive. It means that there is a continuous growth of the migration flows in Spain over the years, although it may not seem so when looking at the graphs because of the adverse impact of certain economic variables during the phases of the business cycle.

The overall migration rate, in its role as a proxy for the total number of engagements, has an estimated coefficient in all the specifications that is clearly positive and quite close to one, as the theory points out. In fact, according to the F-value of the associate statistical test, this coefficient turns out to be not different from one at the 5% level in all regressions reported in Table 2.

Let us turn now to the analysis of the economic variables related to the regional labor markets and their impact on the bilateral migration flows.

Starting with the unemployment variables, there are some interesting points to comment. First of all, the interpretation of regional unemployment is different in the job-hiring model to that implied by human capital approaches. These approaches introduce regional unemployment rates as a way of measuring regional differences in employment opportunities. For the present approach, on the other hand, the

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5.   Thus, in the case of Regression 3 in Table 2, the coefficients of the economic variables are almost identical, but the R^2 is 73.7% when the *Fi, Fj* set of dummies (plus distance) is used.

TABLE 2: Interregional Migration Equations. Spain: 1963-1993

Dependent Variable: Ln(Mij/Li)   No. of Observations: 8380

Explanatory Variables	Regression 1	Regression 2	Regression 3
u_i	-0.012 (-4.997)	0.058 (9.76)	0.056 (9.61)
u_i^2		-0.0017 (-11.0)	-0.0017 (-10.9)
u_j	-0.012 (-5.07)	-0.0073 (-2.96)	-0.0077 (-3.18)
Ln(w_i/w_j)	-1.33 (-11.4)	-1.15 (-9.8)	-1.15 (-9.83)
Ln(w_i/w_j)$_t$-Ln(w_i/w_j)$_{t-1}$	-0.596 (-3.05)	-0.688 (-3.74)	-0.684 (-3.50)
Ln(Pi/Pj)	1.161 (6.22)	1.029 (5.53)	1.03 (5.54)
$\dot{n}_i$	-0.021 (-7.35)	-0.016 (-5.62)	
$\dot{n}_j$	0.007 (2.58)	0.010 (3.45)	
$\dot{n}_i - \dot{n}_j$			-0.013 (-5.91)
Ln(M/L)	0.93 (8.90)	0.929 (11.5)	0.888 (11.6)
Year	0.08 (19.5)	0.023 (7.05)	0.024 (7.85)
R-squared (%)	86.0	86.1	86.1

Notes:

(a) Data sources: Migration data has been obtained from the Statistical Yearbook published by I.N.E. The rest of the variables have been obtained from the provincial database elaborated by the Research Department of the Banco de Bilbao.

(b) Equations estimated by Fixed Effects Least Squares.

(c) t-statistics in parenthesis. Critical values: at 5% for one-sided test, 1.64; at 10% level, 1.28.

(d) Tests on the coefficients of $\dot{n}_i$ and $\dot{n}_j$ being equal in absolute value for Regression 2: $F(1, 8082)=2.76$

(e) Hausman test on the endogeneity of employment growth variable in Regression 3: $\chi^2(22)=61.69$. Omitting this variable from the list of independent variables does not change significantly, in statistical terms, any of the coefficients of the rest of the variables specified in this table.

significance of the rates is a sign of the higher intensity of the unemployed when job-searching. One of the main findings of this study is that in the case of Spain the functional form in which the unemployment rate for the region of origin is introduced in the specification certainly makes a difference to some of the estimated coefficients.

The specification reported in the first column of Table 2 considers the regional unemployment rate as implied by the theoretical considerations. In this case, the coefficient for u_i is negative and statistically significant. It means that out-migration is statistically dependent of the unemployment rate in a region but in the opposite way to the predictions of the theory. However, this result has also been found in a number of previous studies. The coefficient for the destination region is significant at the 5% level and takes on the right sign, according to what should be expected from the theory, as it turns out to be negative.

Column 2 refers to the specification in which u_i^2 has been included. The result is that the coefficient for u_i is now 0.059. It appears within the context of this specification that this coefficient is highly significantly different from zero and positive. However, this effect is partly offset as the coefficient of u_i^2 is negative and also significant, and much smaller in absolute value than the coefficient for u_i. It means that, as the unemployment rate in region i is larger, its impact on the bilateral outflows from that region is smaller. In fact, according to the point estimates obtained here, when the unemployment rate in the region of origin reaches 16.4%, any further increase in that rate will lead, assuming that all the other exogenous variables remain unchanged, to a fall in the bilateral flow of people out of that region. Therefore, when the unemployment rate in the region of origin is included as it has been done here, with the quadratic term, the interpretation of the results for the effect of that variable on migration are much closer to what is suggested by the theory.

In the case of the unemployment rate of the region of destination, the introduction of u_i^2 does not change things very much in the sense that its coefficient goes on being significant and negative, although the point estimate obtained now is -0'0073, smaller in absolute value than in the previous case. The interpretation of these results is that regions with high unemployment are not attractive as destination of migration because the competition to fill a vacancy will be harder. We also tried to introduce u_j^2 in the specification but it failed completely to be significantly different from zero, concluding therefore, that the deviation in the functional form of the regional unemployment rates from that implied by the theory affects only the region of origin, not the one of destination.

Our results in relation to the effect of origin and destination unemployment rates are similar to those obtained by Gabriel et al. (1993) for the U.S. Their results also show support for the hypothesis that both rates are significant and affect migration according to what is expected, and also indicate that this effect is asymmetric in the sense that the coefficients are statistically different in absolute value from each other.

The next variable to comment on is relative wages. These are relative nominal wages, and as it can be seen, they have a negative and significant effect on migration rates. The change in this variable affects also significantly migration rates, with a negative effect. According to the way this variable has been introduced in the model, it can be interpreted as the difference in the growth rates of wages between origin and destination regions. The signs of these coefficients imply that people tend to go not only to those regions with higher wages, but also to regions where wages are growing faster. If all the regions had the same rate of growth in wages (or, alternatively, in the long run), then according to the estimates of the coefficient the elasticity of the dependent variable with respect to current relative regional wages would be -1.2. The interpretation of this results indicates that a rise of relative wages; which, when $w_i < w_j$, means hat the regional wages are more similar; leads to a fall in the migration rate from region i to region j for a given national rate. This result is important as it confirms what was anticipated from Figures 2 and 4 about a close relationship between the fall in the interregional migration rates and the fall in the coefficient of variation of nominal wages across region. In this respect, the result is quite different to the case of the U.K., where Jackman and Savouri (1991) have found a perverse wage effect.

Nevertheless, in the short run, when relative wages vary from one period to the next one, the elasticity of interregional migration rate with respect to current relative wages is larger (in absolute value): almost -2%, although in this case we should also take into account the opposite effect past relative wages have on migration.

As indicated earlier, we have tried prices separately from nominal wages. As it can be seen from table 2, the coefficient on the variable relative prices, entered as $Ln(Pi/Pj)$, is positive and significantly different from zero. This means that the migration flows go from regions with high prices to those with lower prices. Furthermore, the coefficient on prices is equal, but with the opposite sign, to the coefficient on relative nominal wages. Therefore, we can conclude that, in fact, it is relative real wages one of the factors that drives migration flows. We also tried the change in relative prices, as we did with wages, but the coefficient was not significantly different from zero[6].

Let us analyze now the regional employment growth variables, acting as a proxy for regional vacancy rates. As there could be some problems concerning the endogeneity of these variables, we have instrumented them using the same variables lagged two periods as instruments. However, the results are practically equal to those obtained when the variables are not instrumented, not only in terms of the sign of the coefficients but also with respect to the point estimates. Thus, we have reported just the coefficients that appeared as the result of using O.L.S. without instrumenting these variables. This result coincides with those obtained by Jun and Chang (1986) when they conclude that in models with two simultaneous equations for migration and employment change the former does not enter as a significant regressor in the equation to explain the latter variable.

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6.   The coefficient on this variable was -0.368 with a standard deviation of 0.278, giving a t-statistic equal to -1.325. The coefficients on the rest of the variables were not affected by the elimination of this variable.

The first thing to note is the significance of the coefficients of both the origin and destination employment growth variables in the first specification. They are signed correctly in the sense that they imply that people are less likely to migrate from regions where employment is growing, which in turn are more attractive to migrants. This result about the significance of the effect of employment growth on migration is maintained in most of the specifications considered in this analysis. This seems to contradict the results obtained by Bentolila and Dolado (1991) about the lack of significance of the ratio of the regional employment growth to the national one. Furthermore, when an F-test is carried out to check whether the two coefficients are equal to each other in absolute value, the result is an F-value of 2.76 in the case of Regression 2 in Table 2, so that we fail to reject it. The last column in Table 2 shows the estimates resulting when the regional employment growth variables are entered as the difference of one from the other, rather than on their own. The point estimates for employment growth show that for each percentage point of increase in employment in a region, there is a reduction of 1.3% in the out-migration rate from that region, provided everything else remains the same. Equally, there will be an increase of around 1.3% in the out-migration rates from the rest of the regions towards that one.

The results commented so far indicate that either the second or the third specifications reported should be the preferred one and that all the variables have the sign expected from the theory. Nevertheless, there is this question of the functional form in which the origin unemployment rate is to be included as the coefficient on u_i^2 is negative and significant. The interpretation of this finding within the framework of the theoretical model used here is that the unemployed of the region of origin search for a job out of the own region less intensively as the unemployment rate rises, and that there is a maximum to the region's aggregate intensity of search.

The first possible explanation concerns the search-intensity of the long-term unemployed. As the unemployment rate for Spain has been increasing, the composition of the unemployment pool has shifted towards the long-term unemployed. Of the total number of unemployed, 56.8% of them had been unemployed for over 12 months in the last quarter of 1985, while in the same quarter of 1976 this percentage was just 17.5%. Therefore, the increase in the proportion of the long-term unemployed, combined with this lower search-intensity could explain the significance of the coefficient of u_i^2.

This explanation has, however, two drawbacks. The first one is that, a priori, there is no reason to expect a change in the attitude towards the intensity of search on the side of the unemployed across regions, other than that derived by the different composition of the unemployment pool, in relation to the own regional unemployment rate. It means that the coefficient of the variable u_j^2 had to be also significant. And this is not the case. On top of that, Alba-Ramírez and Freeman (1990), in a work based on a survey of the labor force activity in Spain in 1985, discarded the existence of an adverse impact of long term unemployment on job-finding, as they found that the hazard rates linking the chances of job finding to

duration of unemployment were constant[7]. The way around these drawbacks is by assuming that the long term unemployed will prefer to concentrate their job search efforts in their own regions. This is compatible with the coefficient on u_i^2 being negative and also compatible with u_j^2 not being significant as the search-intensity of the long-term unemployed should not be lower.

The second possible explanation for the lower impact of the unemployment rate of the region of origin as it increases relates also to the composition of the unemployment pool but from a different point of view. As the unemployment rate has increased in Spain, the proportion of unemployed who are head of households has declined from 31.6% in 1977 to 26.7% in 1985. This means that secondary workers within a family are now a larger fraction of the unemployed. Spouses and young people mainly form this group. With respect to spouses it seems clear that family ties prevent them from being active job seekers in locations which are far from the family residence. For the young people, on the other hand, this family tie seems to be less obvious. However, in this respect, the proportion in Spain of unemployed youth living at home has substantially increased. This is probably due to a greater economic dependence on the rest of the family and, therefore, they are less able to afford the financial costs of moving and settling down in a different region, so that they will not be so much interested in searching for a job in a different region. In any case, the search intensity of both groups for a job in the own region is not affected, so that there is no reason for u_j^2 to be significantly different from zero.

The two reasons given above for considering that the unemployed are less intensive in their search for a job in a different region to that of their own residence are in fact related if we take into account that the compositional shift of the unemployment pool towards non-household heads affects also the long term unemployment. Again, Alba-Ramírez and Freeman (1990) conclude from their study of the survey of the labor force in Spain in 1985 that the long term unemployed are mainly secondary workers (women, older workers and non-household heads) arguing that the family acts as a form of unemployment insurance for this group of people.

From the empirical point of view, the data also seem to support the hypothesis of secondary earners in a family being less likely to search for a job outside the region. With respect to young people (less than 25 years old), in 1970 they represented 51% of migrants, and this percentage dropped to just 46% in 1986. For women, although their share of migration hardly moved, it just went up from 48.5% in 1970 to 50% in 1985, this increase did not keep pace with the increase in their participation rate in the labor force, which was 23.7% in 1970 and went up to 29.4% in 1980.

Therefore, we can conclude that, as the unemployment rate rises, there seems to be a compositional shift of the unemployed which make them less intensive in their job search out of their own region, though

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7. This result is in contrast to Schmitt and Wadsworth (1990) for the UK, as they found that the degree of job search of the unemployed declines with duration. Also, some current research about Spanish unemployment shows that search intensity is low at the beginning of the unemployment spell and increases when a reduction in the level

equally intensive in it. Nevertheless, this point is difficult to test empirically, specially within the present framework of analysis, as the bilateral flows between regions are not disaggregated by any category of migrants at all.

Analysis of stability of the coefficients

Finally, the last point to comment on this section refers to the stability of the coefficients estimated. The period used in this analysis is a very large one. It covers 31 years with certainly important social changes in Spain, which mainly took place in the mid-seventies. In the first place we have that 1975 saw the death of Franco, putting an end to the dictatorship, and starting the transition towards democracy and political decentralization. Furthermore, in the following year, 1976, Trade Unions became legal. For that reason, we have split the sample in two in order to check the existence of some structural change in the economic determinants of internal migration. Consequently, the first sub-period goes from 1963 till 1974, i.e. the first 12 years of the period and 3222 valid observations, while the second sub-period goes from 1975 till 1993, i.e. the last 19 years and 5168 valid observations.

Table 3 shows the results obtained for this purpose. We have fitted one single regression for the whole period doubling initially the number of dependent variables in order to test on the stability of each of the 272 coefficients of the flow dummies, and also on the coefficients of the rest of the variables considered. Then, we have imposed constancy on those coefficients that do not change from the first sub-period to the second and the rest of the variables to change their coefficients between the two sub-periods indicated. The economic variables and the trend variable are among the latter. Finally, we have that the number of independent variables has noticeable increased up to 522, including flow dummies, economic variables, trend variables and year dummies plus a constant. The column on the left of these two corresponds to the coefficients of the variables for the first sub-period and the column on the right to the coefficients for the second sub-period, but all of them have been obtained within the same regression. We have done a Chow test to check for the structural change in a subset of coefficients, giving an F-value equal to 25.72. This means that we clearly reject the null hypothesis of no structural change. We can see that there is a change in almost all the coefficients of the economic variables (the corresponding F-values are reported at the end of Table 3), which means that, effectively, there is a structural break in the people's response to these variables in the present context.

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of unemployment benefits is approaching, and that long-term unemployed search less intensively, in average.

TABLE 3: Test on the stability of the economic coefficients

Explanatory Variables	1 Single Regression	
	1963-1974	**1975-1993**
u_i	-0.131 (-4.90)	0.056 (10.6)
u_i^2	0.006* (1.45)	-0.0016 (-11.4)
u_j	-0.067 (-4.67)	-0.014 (-6.02)
$\text{Ln}(w_i/w_j)$	0.072* (0.569)	0.448 (3.77)
$\text{Ln}(w_i/w_j)_t - \text{Ln}(w_i/w_j)_{t-1}$	-1.297 (-8.38)	
$\text{Ln}(Pi/Pj)$	-0.256* (-0.839)	0.089 (0.38)
$\dot{n}_i - \dot{n}_j$	-0.018 (-5.16)	0.002* (0.76)
$\text{Ln}(M/L)$	0.761 (13.16)	0.951 (16.8)
Year	0.086 (18.7)	0.015 (5.45)
No. of Observations	8380	
No. of Independent Vbles.	522	
RSS	1342.055	
R-squared (%)	91.8	

Notes:

(a) Equations estimated by Fixed Effects Ordinary Least Squares. t-statistics in parenthesis. The coefficients with an asterisk (*) are not significantly different from zero. Eliminating these variables does not affect the rest of the coefficients.

(b) The results have been obtained when allowing for changes between the two sub-periods only in those coefficients that are significantly different. Result of the Chow test for a change in a subset of coefficients: $F_{(226, 7857)} = 25.72$

(c) Tests on the stability of the coefficients of the economic variables:

Variable	F-value	p-value
u_i	$F_{(1, 7857)} = 48.23$	0
u_j	$F_{(1, 7857)} = 13.53$	0.0002
$\text{Ln}(w_i/w_j)$	$F_{(1, 7857)} = 22.79$	0
$\text{Ln}(w_i/w_j)_t - \text{Ln}(w_i/w_j)_{t-1}$	$F_{(1, 7857)} = 1.79$	0.182
$\dot{n}_i - \dot{n}_j$	$F_{(1, 7857)} = 16.38$	0.0001

Looking at the unemployment variables we notice that some of the results are a bit puzzling. During the first sub-period the unemployment rate of the region of origin has the "wrong" effect on migration, as its coefficient is negative. The coefficient of u_i^2 for the first years is not statistically different from zero; but this result should not be surprising as the unemployment rates during that time remained at relatively low levels, certainly below the threshold level for the unemployment rate of 16.4% obtained in the case of a single regression for the whole sample. Nevertheless, in the final years, the specification for the unemployment in the region of origin is like the one obtained in Table 2, with a positive coefficient for u_i and a negative and significative one for u_i^2 and the comments already made in the previous sub-section apply also here.

Following the job-hiring model we follow here, the negative sign for the first sub-period means that unemployed people are less intensive in their search for a job in a different region. It shows, therefore, an important change in the attitudes of the people. As Olano (1990) has pointed out, the migratory movement during the 60's is mainly a rural-to-urban phenomenon. In this system of migration, one of the main characteristics is that the migrants are not necessarily unemployed when they move out of the rural areas. According to it, people moved to a different region not only to get a job, but also to get a more stable and better paid job. It means, that currently employed people were actively looking for jobs out of their regions. This can help to explain the negative sign of u_i during the first years, as seen earlier, but it can also help to explain the larger impact unemployment rate in the region of destination have during these years as these people move from job to job in different areas (the construction sector served as a "bridge" for them) and they could be poorly placed to compete for a job if they have not secured it beforehand, due to the lack of skills or qualifications. This effect disappears as the general level of education increases everywhere and becomes more homogenous.

The coefficient of the unemployment rate in the region of destination takes a negative sign in both periods, as should be expected according to the theory. It implies that those regions with high unemployment are less attractive to migrants as the competition to fill a vacancy will be harder. Despite the sign being the same in both periods, i.e. negative, there is also a structural change in the effect of this variable. In this case, the effect on migration is much smaller, in absolute value, in the later years, which means that people are now less worried about the degree of competitiveness when looking for a job, probably because of the high unemployment rates everywhere. Alternatively, the existence of return migration flows could have also induced a reduction in this coefficient[8].

The relative wage variable has the "wrong" sign in both periods, although it is not significantly different from zero in the first one. This means that migration flows are independent of regional wage differences in the first period, and also that people tend to move out of regions with higher wages and go to those regions with lower wages during the second period. Therefore, in this case there is also a perverse wage effect as that found by Jackman and Savouri (1991). Nevertheless, the coefficient of the

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9.   For an analysis of the characteristics of the migrants that return to their place of origin see, for example, DaVanzo (1983) and Morrison and DaVanzo (1986).

change in relative wages, or the difference in the rate of growth of regional wages, is negative and significant in both periods, indicating that the wage effect is not that "perverse". This is the only coefficient of the group of the economic variables that remains the same across both sub-periods.

For the second sub-period it is likely that a positive wage effect appears as a consequence of the presence of return migration flows. This is not inconsistent with the obtained negative sign of the difference in growth rates. In this respect, it is worth mentioning that wages are more homogenous in the 80's than in the 60's in Spain, as it is shown by the coefficient of variation in Figure 4. This process towards a greater homogeneity of wages implies that regions with lower wages experienced a greater rate of growth. Therefore, if some of the migrants are returning to their regions of origin, which initially had lower relative wages, it means that they are going to regions with higher rates of growth. This way, the wage effect as a whole during the second period would be consistent with the presence of return migration and the reduction in the net flows that has taken place since the mid-seventies.

In any case, the results for the wage effect are certainly strange; especially if we look at those reported in Table 2. It is possible that they could be related to the timing of the structural change. From Figure 4 we can see that it is in the decade of the 70's and in the second half of the 80's when the reduction in the wage inequality index took place. By considering 1975 as the year of the structural change, we are breaking into two this period of high variability in this variable, so that we are left with two sub-periods with a much less reduced variability in relative regional wages. Something of this kind could also explain the lack of significance of relative prices in both sub-periods, which is also surprising.

It is also important to notice also that the relative employment growth variable has the expected negative effect on interregional migration flows during the first sub-period under consideration. It indicates that people prefer those regions where there are better chances to get a job, as far as employment growth is acting as a proxy for vacancies. Nevertheless, the effect of this variable in the second period is not significantly different from zero. In this case, the reason for that lies in the fact that most of this period corresponds to years of economic crisis, and employment growth was very limited in all regions.

Finally, there is also an important reduction in the coefficient of the trend variable, reflecting somehow the lower intensity of the migration flows during the last years of the period analyzed here.

The change in the coefficients of the economic variables affecting migration that we have found in our analysis could reflect these two kinds of structural breaks in the Spanish society. However, as Olano (1990), among others, have pointed out, there is a genuine change in the behavior towards migration followed by the migrants. During the sixties and the first half of the seventies it is possible to find the main characteristics of the rural-to-urban migratory movements. This way, migrations are intensely polarized, with clearly delimited areas of out-migration and areas of in-migration and mainly unidirectional flows. From that moment on, there is a considerable reduction in the net rates of migration between the different

regions in Spain. There is also a change in the sign of these net migrations for some regions, with a considerable increase of the return migration. All these things seem to indicate that the traditional system of rural-to-urban migratory movements have come to an end in Spain during the last years of the period considered in this analysis. This change in the system of migration is a consequence, at least to a certain extent, of the change in economic structure, with a service sector being the most important in the economy and a declining industry. But it is also a consequence of the general increase in the levels of education and skills of the labor force.

4. CONCLUSIONS

In the present paper we have done an empirical study of the migration phenomenon within Spain using data of the migration flows among the 17 regions from 1963 till 1993.

From the analysis carried out here, it seems clear that interregional labor mobility responds to regional labor market variables: unemployment rates, wages and employment growth. In particular, according to the results reported in the last column of Table 2 it does so in a way which suggests that:

1) High unemployment rate in a region tends to increase out-migration because unemployed people search more actively than the employed. This is so with the qualification that for unemployment rate higher than a certain threshold, there is a relative reduction of this effect.

2) High unemployment rate in a region also tends to discourage in-migration, but without the qualification expressed in the case of out-migration.

3) People prefer to search for jobs in those regions where wages are growing at a relatively higher rate.

4) Regions where employment growth is relatively larger will be more likely to end up with a larger number of in-migrants. If we accept that employment growth is a sufficiently good proxy variable for the vacancy rate, then it is interesting to note that, as commented earlier, both the vacancy rate and the unemployment rate enter the equation and are significant because they play different roles in the process of interregional migration, derived from the view of this process as a particular case of the hiring function.

These general results can be said to be fairly robust, at least in terms of the direction of the effects, as they also hold when the sample is divided in two sub-periods in order to test for stability of the coefficients. In this respect, our results confirm the existence of a structural break in the interregional migration flows, as there is a change in the magnitude of almost all the coefficients of the economic variables. However, this is consistent with the evolution of the Spanish political and economic situation, in the sense that in the mid-seventies there is not only a change of the political situation, but also a breakdown of the economic relationships. Although there is effectively a change in the estimated coefficients, it does not invalidate the general results described earlier apart from a qualification. The unemployment rate of the

region of origin has a negative effect on migration during the period 1963-1974, which can be explained as a consequence of the rural-to-urban system of migration.

However, in the case of Spain, this process of regional redistribution of the labor force has not prevented the increase of the regional differences during the last years, and the migration rate has been falling down when apparently it was more needed to help with the differences. This study suggests that this be due to several factors. In first place, when the rate of unemployment is really high, as it is the case of Spain and its regions during the 80's, the unemployed are less intensive in their search for a job out of their region of residence. This topic of the different search intensity according to the characteristics of the unemployed and also to the distance of the potential job is a very interesting one, which deserves some further research, although in a more general framework than the present one, which is restricted to interregional movements of the labor force.

A second reason lies in the fact that migrants take the rate of growth of regional wages into consideration. Therefore, as long as a process of geographic homogenization of nominal wages has taken place, there have been incentives for people to migrate back to their regions of origin. However, in relation with the effect of regional wages on migration it is important to mention the lack of significance of the variables that reflect the differences in the regional cost of living, which seems a bit surprising.

Finally, when explaining the fall in the interregional movements over time we cannot forget the general lack of vacancies, as proxied by employment growth, leading to a fall in the incentives to move to different region or to search for jobs elsewhere. In fact, regional employment growth also has a significant effect on migration, despite not having been found so by Bentolila and Dolado (1991), in what seems to be a better way to capture employment opportunities than the regional unemployment rates, which was the role assigned to them by the human capital approach. In this case, the data seems to support the job-hiring based model described here in the new interpretation given to regional unemployment, when asserting that it means that unemployed are more intensive in the search for a job, so that regions with high unemployment are expected to have high out-migration and low in-migration.

In general terms, we can assert that although there are some points which require some further investigation in order to clarify the effect of the economic variables within the framework of this approach, at least when applied to the case of Spain, the analysis carried out in this paper indicates that there are some grounds to believe that the job-hiring model is a good approach to understand the process of interregional migration of the labor force in Spain.

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