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The regional distribution of unemployment. A microeconomic perspective.

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Abstract: Regional disparities in unemployment rates are large and persistent, particularly in some economies such as Spain. Previous contributions to the literature have provided evidence on their magnitude and evolution, as well as on the role of some economic, demographic and environmental factors in explaining the gap between low and high unemployment regions. Most of these studies have used an aggregate approach. That is, they have not accounted for the individual characteristics of the unemployed and the employed in each region. This paper aim at filling this gap, as it addresses the analysis of regional differentials in unemployment rates by using the information from the Spanish wave of the Labour Force Survey. An appropriate decomposition of the regional gap in the average probability of being unemployed allows us to tell the contribution of differences in the regional distribution of individuals' characteristics from that attributable to a different impact of these characteristics on the probability of unemployment. The results suggest that the well-known disparities in regional unemployment are not just the result of regional heterogeneity in the distribution of individual and job characteristics. Non-negligible differences in the probability of unemployment remain after controlling for that type of heterogeneity, as a result of differences across regions in the effect of the individual characteristics. Among the factors considered in the analysis, regional differences in the individuals' endowment of human capital, and in its effect, play an outstanding role.

JEL codes: C25, J64, J70, R23.

Keywords: Regional labour markets, Regional unemployment gap, human capital, Gap decomposition for non-linear models.

1. INTRODUCTION

Regional disparities in unemployment rates are sizeable and persistent in many countries (OECD, 1989, 1990, 2000; Blanchard and Katz, 1992; Decressin and Fatas, 1995; López-Bazo et al, 2002; Overman and Puga, 2002; Cracolici et al, 2007; Bande et al, 2008; Filiztekin, 2009). Aside from the fact that labour markets remain essentially regional, there are reasons for considering unemployment from a regional perspective. Following Elhorst (2003) they can be summarised in i) the magnitude of regional differences between regions within countries, ii) the absence of explanations for the existence of regional unemployment disparities in macroeconomics, and iii) the inefficiency created by such disparities in the economy as a whole.

In a world characterized by the absence of adjustment costs and rigidities, one would expect the differences in unemployment rates across locations not to persist. Excess labour in one area should quickly disappear as workers move to areas with lower unemployment rates. However, the evidence drawn from some studies (Lazar, 1997; Evans and McCormick, 1994; Martin, 1997; Martin and Sunley, 1999; Overman and Puga, 1999; López-Bazo et al, 2005), indicate quite the opposite: regions with high unemployment in a given decade continue to suffer high unemployment rates in the following decades, while regions with low unemployment continue to enjoy low rates.

The slow rate of wage adjustments and the large costs incurred by people and firms when migrating are likely to explain why idiosyncratic shocks, or contrasting regional responses to common shocks, might cause unemployment rates to differ markedly across regions for long periods. Given this explanation, the heterogeneity in the spatial distribution of unemployment can be seen as a disequilibrium phenomenon as defined in Marston (1985). A second explanation as to why certain areas have differing unemployment rates is also provided in Marston (1985), drawing on ideas in Hall (1972) and Rosen (1974). A steady-state relationship in unemployment rates across regions exists as a function of their endowment of certain factors and since this endowment differs from one region to another, the spatial distribution of unemployment is not homogeneous. Moreover, as long as the endowment remains stable, the distribution of unemployment should not change dramatically. This equilibrium hypothesis is based therefore on the idea that workers have incentives not to migrate

when unemployed because, in one way or another, they value these endowments. On the other hand, in selecting their optimal location firms take account of regional endowments besides wage and unemployment rates (Partridge and Rickman, 1997). Evidence regarding high wages in areas of high unemployment supports this view, as does the preference for certain facilities and amenities. Martin (1997) and Partridge and Rickman (1997) extend the list of factors that might explain unemployment equilibrium differentials to permanent differences in economic, institutional and labour market characteristics across regions.

Most previous contribution to the empirical literature (Elhorst 1995; Partridge and Rickman 1997; Taylor and Bradley 1997; López-Bazo et al, 2002, 2005) have aimed at analysing the determinants of regional inequalities in unemployment by means of an aggregate specification in which the unemployment rate in each region, or the deviation to a benchmark economy (the nation-wide average or the region with the lowest rate) is related to regional magnitudes proxying for both the disequilibrium and the equilibrium determinants of unemployment. It should be notice that this aggregate approach imposes the same effect in all regions to each variable, while only partially (and thus imperfectly) accounts for regional heterogeneity in individual, household, and job characteristics).

The expected effect of education on unemployment can be used to illustrate our argument. The level of education in a region is supposed to have a downward effect on its unemployment rate, as evidence at the micro level suggests that education improves individuals' probability of not being unemployed (e.g. Mincer, 1991). Accordingly, the effect of the regional endowment of education on the regional unemployment rate is estimated to be negative and significant in 6 out of the 9 studies summarized by Elhorst (2003), but it is no significant in the remaining three studies. The effect is positive, and in some cases significant for the set of Canadian regions in the study by Partridge (2001), and no significant for the Spanish regions in López-Bazo et al (2002, 2005). Therefore, it seems to be some contradiction between the expected effect of education on individuals' probability of unemployment and the evidence from the empirical evidence obtained using micro-data, and (at least part of) the evidence from aggregate studies using regional data.

In this paper we aim at complementing the previous evidence on regional unemployment disparities obtained from studies using aggregate data, with results based on the exploitation of information from micro-data. By using information for individuals in each region we are able to control for the spatial distribution of the set of characteristics that shape the individual outcome under analysis and, by aggregation, the average outcome at the regional level. As far as we know this is a novel contribution to the literature analyzing regional disparities in the labour market outcomes (unemployment and participation rates).

Actually, the use of information at the level of the individuals in each region allows us assessing the contribution of differences in endowments and in returns to characteristics that determine the probability of unemployment to the regional unemployment rate gap. It should be stressed that the decomposition of the gap between two groups of workers (men and women, natives and immigrants, etc) in a magnitude of interest (usually wages) has been standard practice in the labour economics literature since the seminal proposal of Oaxaca (1973) and Blinder (1973). However, the application of this methodology to the regional economics literature is scarce (exceptions include García and Molina, 2002 and López-Bazo and Motellón, 2009). In addition, the standard decomposition can only be applied to linear models. As a consequence, it is not suitable to decompose the gap in the probability of unemployment. Instead, we apply the generalized decomposition method suggested by Yun (2004), which allows the decomposition in the case of non-linear models. Such approach has recently been applied by Motellón (2008) to analyze the gap in the probability of being hired by a temporary contract in the Spanish regions. Finally, we focus special attention to the role of individual's education in explaining regional unemployment rate differentials.

The results indicate that only part of the regional gap in the unemployment rates can be explained by the spatial distribution of individual and job characteristics. In other words, that Spanish regions also differ in the effect that these characteristics have on the probability of being unemployed, and that they explain a big deal of the gap. The immediate implication of this result is that policies designed to increase the endowment of *good* characteristics in high unemployment regions will only have a partial effect. The reason for that is that those regions also differ in the effect that characteristics have

on the probability of unemployment. Therefore, a side effect of such type of policies may be the increase in the individual incentive to interregional migration.

2. DATA AND DESCRIPTIVE ANALYSIS

The data source in this paper comes from the second quarter of the Spanish Labour Force Survey (LFS) in the period from 1999 to 2009. The LFS published by the Spanish National Institute for Statistics allows obtaining information on the status of individuals in the labour market (non-participant, employed, unemployed) and personal and household characteristics (gender, nationality, age, education, occupation, industry, number and characteristics of household members, etc). The sample used for our analysis is composed by individuals aging between 16 and 65 years old in each of the 17 NUTS 2 regions in Spain, which are the historical and administrative regions with a high level of political and financial autonomy. It should be mentioned that the design of the sample in the LFS guarantees its representativeness at the regional level.

The unemployment rates in each of the regions and in the country as a whole at the beginning (1999), in the mid-point (2004) and at the end of the period under analysis (2009) are shown in Table 1. This table also includes the average unemployment rate for each region and Spain in the complete period. These figures confirm that unemployment rate differentials across the Spanish regions are sizeable and persistent. If we use unemployment rates as a rough measure of the probability of being unemployed, the figures in Table 1 indicate that an average individual from the active population in Andalucía, or in Extremadura, assumes a risk of experiencing an episode of unemployment that is between 2 and 3 times the one in regions at a distance of a few hundred kilometres.

Another interesting feature is that regional unemployment rates are spatially clustered. The map in Figure 1 clearly indicates that high unemployment is localised in the South-West while the low unemployment rate regions are located in the North and East of the country, plus the capital city of Madrid. Unemployment rates in regions such as Andalucía and Extremadura are systematically above the average in the country, while those for regions such as País Vasco, Navarra, Aragón, and La Rioja are steadily below

the average.¹ Actually, based on the average unemployment rates in the entire period 1999-2009 we define two groups of regions. The group of high unemployment rates (HUR) is composed by the first two regions mentioned above, whereas the latter four regions compose the group with low unemployment rates (LUR).² Table 2 shows that the gap in unemployment rates between the two regional groups is large and persistent, though it decreases somewhat over the period under analysis, from 16 to 12 percentage points.

These two groups of regions may have different unemployment rates because there are differences between regions in the distribution of individuals' characteristics that determine the individual probability of unemployment. That is to say, the regional gap in unemployment rates might be explained by differences in regional endowments of the above-mentioned characteristics. Following with the example in the introductory section, the gap between HUR and LUR groups would be explained by the lower educational attainment of individuals in the HUR regions. Actually, the simple description of the observable characteristics in the two groups of regions in Table 3 shows that, although there are not significant differences in some of them (gender, nationality, age), regions differ markedly in the endowment of some other determinants of the probability of unemployment. Briefly, it can be observed that HUR regions show lower educational attainment and greater family size.

Therefore, the key point is to know whether these endowment disparities explain most of the observed regional unemployment rate gap. To have some preliminary evidence on such issue, we computed the unemployment rate in each region within the categories of the observable characteristics. The results are summarized in Table 4. Were differences in the aggregate probability of unemployment between regions explained by the different distribution of endowments, we would not observe differences in that probability within each of the categories. This is against the evidence obtained in Table 4 as the probability is much higher in the HUR group for almost all the categories. This suggests that there can be a role for differences in the effect of the observed characteristics (i.e. their return) when explaining the regional gap in unemployment

¹ López-Bazo et al (2005) showed that the regional ranking of the unemployment rates in Spain is highly stable since the early seventies.

² Conclusions in this paper are robust to alternative definitions of the two groups of regions. Results are available from the authors upon request.

rates. In the remaining sections we estimate those effects in each group of regions and decompose the unemployment rate gap in the contribution of differences in endowments and in returns to the characteristics.

3. METHODOLOGY

Our empirical setting assumes that the probability of being unemployed in a group of regions G (=HUR, LUR) depends on a set of endowments of the individual (such as gender, nationality, age and education), on household characteristics, and on the density of economic activity in each region:

$$\text{prob}(U = 1)_G = \Phi(X_G \beta_G) \quad (1)$$

where $\text{prob}(U=1)$ denotes the probability of unemployment, Φ the cumulative normal distribution function, X includes the above-mentioned characteristics, and β is the corresponding vector of coefficients.

From the probabilistic specification in (1), the difference in $\text{prob}(U=1)$ at the first moment —i.e. the mean difference of $\text{prob}(U=1)$ — between groups HUR and LUR can be decomposed as:

$$\overline{\text{prob}(U = 1)_{\text{HUR}}} - \overline{\text{prob}(U = 1)_{\text{LUR}}} = \left[\overline{\Phi(X_{\text{HUR}} \beta_{\text{HUR}})} - \overline{\Phi(X_{\text{LUR}} \beta_{\text{HUR}})} \right] + \left[\overline{\Phi(X_{\text{LUR}} \beta_{\text{HUR}})} - \overline{\Phi(X_{\text{LUR}} \beta_{\text{LUR}})} \right] \quad (2)$$

where “over bar” represents the value of the sample’s average. The first term in the RHS of (2), $\left[\overline{\Phi(X_{\text{HUR}} \beta_{\text{HUR}})} - \overline{\Phi(X_{\text{LUR}} \beta_{\text{HUR}})} \right]$, corresponds to differences in characteristics between individuals of different groups of regions, while the second term, $\left[\overline{\Phi(X_{\text{LUR}} \beta_{\text{HUR}})} - \overline{\Phi(X_{\text{LUR}} \beta_{\text{LUR}})} \right]$, is the effect of differences in coefficients, the behavioural responses to characteristics.

The overall decomposition in (2) is thus of the form of the traditional Blinder (1973) and Oaxaca (1973) decomposition. But the non-linearity in $\Phi(\cdot)$ prevents computing the

particular contribution of each of the characteristics following the traditional decomposition. This is an important drawback if, as in this study, one is interested in assessing the particular contribution of a characteristic, or set of characteristics. In our case, we are particularly interested in, on the one hand, disentangling the contribution of the personal and the household characteristics and, on the other, in checking the role of regional differences in education. For that reason we follow the approach suggested in Yun (2004) in obtaining a detailed decomposition of the gap in the probability between the two groups of regions. In the case of our probabilistic specification, the detailed decomposition can be obtained from:

$$\overline{\text{prob}(U=1)_{\text{HUR}}} - \overline{\text{prob}(U=1)_{\text{LUR}}} = \sum_{i=1}^k W_{\Delta X}^i \left[\overline{\Phi(X_{\text{HUR}}\beta_{\text{HUR}})} - \overline{\Phi(X_{\text{LUR}}\beta_{\text{HUR}})} \right] + \sum_{i=1}^k W_{\Delta\beta}^i \left[\overline{\Phi(X_{\text{LUR}}\beta_{\text{HUR}})} - \overline{\Phi(X_{\text{LUR}}\beta_{\text{LUR}})} \right] \quad (3)$$

where:

$$W_{\Delta X}^i = \frac{\left(\overline{X}_{\text{HUR}}^i - \overline{X}_{\text{LUR}}^i \right) \beta_{\text{HUR}}^i}{\left(\overline{X}_{\text{HUR}} - \overline{X}_{\text{LUR}} \right) \beta_{\text{HUR}}}, \quad W_{\Delta\beta}^i = \frac{\overline{X}_{\text{LUR}}^i \left(\beta_{\text{HUR}}^i - \beta_{\text{LUR}}^i \right)}{\overline{X}_{\text{LUR}} \left(\beta_{\text{HUR}} - \beta_{\text{LUR}} \right)}$$

$$\sum_{i=1}^k W_{\Delta X}^i = \sum_{i=1}^k W_{\Delta\beta}^i = 1$$

Therefore, $W_{\Delta X}^i$ and $W_{\Delta\beta}^i$ allow to properly weight the contribution of each variable to the effects of the characteristics and of the coefficients. They can be computed by using the sample average of the characteristic of the LUR and HUR groups of regions, and the estimate of β for the two groups from the probit model in (1).

4. RESULTS

4.1. Regional differences in the effect of the characteristics on the probability of unemployment.

The first step in our assessment of the role played by differences in endowments and in returns is the estimation of the effects of the observed characteristics on the probability of unemployment in each group of regions. The estimate of the coefficients β in the probit models for the HUR and the LUR regions will be used to compute the decomposition in (3).

Before discussing the results for the decomposition, we show that the estimated effects differed markedly between the two groups of regions in all the years under analysis. Although the decomposition directly uses the estimate of the β coefficients, we will base the comparison of the effects of the characteristics on the corresponding marginal effects (as usual in the interpretation of the magnitude of the effects in the probabilistic models).³ Marginal effects are computed based on the estimation of the coefficients in the probabilistic model in (1). The variables included in the model are those for the individual characteristics: gender, nationality, age, years of schooling as the proxy for education,⁴ marital status; and those accounting for the characteristics of the household: number of members, dummy for the head of the household, number of children, dummy for children under 9, and dummy for another employee. In addition, we have included an aggregate variable for controlling for density. Specifically, for each individual in the sample we control for the density of the province in which he/she lives.

Table 5 collects the estimated marginal effects (valued in the sample average for each group of regions) from the estimates of the probit model in the three years under analysis. It can be observed that most of the marginal effects for the categories of the individual characteristics are statistically significant and display the expected sign. Briefly speaking, being a male reduces the chance of unemployment in both types of regions, although its effect decreases substantially over the period. As for having Spanish nationality, it also reduces the chance of unemployment in both types of

³ Results on the estimate of the coefficients of the probit models are available from the authors upon request.

⁴ Results obtained by using a set of dummies accounting for the different levels of education are discussed in section 5.

regions, with a larger effect at the beginning and at the end of the period. Age is inversely related to unemployment chances, but most of its effect seems to be concentrated in the lowest categories. That is to say, there seems to be a clear distinction in the probability of unemployment between the youngest groups (under 30 years old) and the mature active population. Also in this case, the magnitude of the effect of age evolves over time with the size of the rate of unemployment (decreasing from 1999 to 2004 and increasing again in 2009). And it differs markedly between the two types of regions, as the effects for most of the categories in the HUR group doubles that in the LUR regions.

As expected, educational attainment reduces the probability of unemployment. Each additional year of education reduces the probability of unemployment by around 1.5 percentage points in 1999 and in 2004, and by 2.4 points in 2009 in the HUR regions. This means that, on average in those regions, ten years of schooling (approximately primary versus tertiary education) represents a decrease in the probability of unemployment of between 15 and 24 percentage points, depending on the year being considered. In the LUR group, the effect is also negative, though much more moderate in magnitude. Actually, in those regions it is only statistically significant at 1% in 2009, with a magnitude that is less than half the one in the HUR group.

As for the other personal characteristics, being single increases the probability with respect to the others types of marital status in 1999 and 2004. In 2009, there is a positive and significant (at 5%) coefficient as well for being widow and divorced. Finally, there is greater heterogeneity in the significance, and magnitude, of the estimated effects for the household characteristics as they sharply vary across years and between the two groups. In any case, the relevance of those characteristics seems to be clearer in the case of the HUR group. Finally, the coefficient of density is only significant for the HUR regions in 1999 and 2009 and for the LUR group in 2009.

Above all, results in Table 5 confirm the existence of sizeable regional differences in the (marginal) effects of the observed characteristics. This result suggests that regions have different unemployment rates because, as stressed in the previous section, there are regional differences in the distribution of individuals' characteristics (differences in endowments). But also because there is regional heterogeneity in their effect of on the

probability of unemployment (differences in returns). Following the example on the role of education, the regional unemployment gap could be explained both by the fact the individuals in the HUR have lower educational attainment, and because the effect of education of individuals in those regions on the probability of unemployment is also higher.

4.2. Decomposition of the regional gap in the probability of unemployment.

The estimate of the coefficients of the probit models for the two groups in the years under analysis, and the sample averages of the observable characteristics in each group are used to compute the detailed decomposition in (3). It should be mentioned that the probit models were estimated including the normalization in Yun (2005, 2008) to guarantee the robustness of the decomposition to the omitted category for the discrete variables.⁵ The results of the decomposition are summarized in Table 6. The first row of data in that table shows the magnitude of the gap between the two groups in each of the years. It is simply the difference in the average probability of unemployment from the sample of individuals in each macro-region (showed in Table 2). The next row of data displays the part of the gap that corresponds to differences in the endowments of the whole set of characteristics, and to differences in the behavioral responses to all these characteristics. The remaining rows correspond to the results of the detailed decomposition, that is, the part of the gap attributable to each characteristic, or sets of characteristics, distinguishing between the part corresponding to differences in the endowment and that from differences in coefficients. In all cases, a regular font denotes significant at 1%, while the italic is used to denote that the contribution is not significantly different from zero at the usual level.

The overall decomposition confirms that the regional gap in unemployment rates cannot be explained only by the spatial distribution of individuals' characteristics, as the contribution of this component ranges between the 30% and the 40% of the total gap in the period under analysis. In other words, were the observed characteristics in the HUR regions being the same as those in the LUR group, the regional gap in unemployment rates would have still been as high as 12, 9, and 7 percentage points in 1999, 2004, and 2009 respectively. Therefore, most of the gap seems to be related to differences in

⁵ Yun (2005) showed that the parametric constraints suggested in Gardeazabal and Ugidos (2004) are equivalent to the normalization proposed in his method.

coefficients, although the contribution of this component slightly decreased in the last year under analysis. In any case, it should be mentioned the important effect attributable to the difference in the intercept, that as usual in the literature is included (perhaps unreasonably) within the coefficients component. When the effect of the intercept is subtracted from that of the difference in coefficients, it is observed that its net contribution is even negative in 2004 and 2009. That is to say, differences in coefficients favored the HUR regions, in the sense that they prevent the regional gap in unemployment rates to be even wider.

As for the results of the detailed decomposition, it is observed the important contribution of differences in education. Educational attainment has been the individual characteristic with the highest contribution to the regional differences in endowments, increasing its effect over the period under analysis (almost 50% of the total contribution of differences in endowments in 2009). However, we should keep in mind that the lower educational attainment in the HUR regions only explains a small portion of the total gap (around 2.5 percentual points of the gap of 12 percentual points in 2009). Interestingly, the size of the contribution of differences in the return to education is even greater, though the sign of this component is negative. To interpret the negative contribution of differences in the return to education, it should be kept in mind that the estimated coefficient for years of schooling is negative in the two groups, being higher in magnitude in the HUR group. Therefore, in regions with high unemployment, additional education reduces more intensively unemployment than it does in regions with low unemployment. This means that if the effect of education in HUR regions will reduce in magnitude to that observed for the LUR group, the probability of unemployment among individuals with high levels of education in the HUR regions will increase, contributing to widen the regional gap in unemployment rates.

The contribution of differences in the endowment of age and the other personal characteristics seems to be modest. But once again, a more intense contribution is related to the behavioral responses to those characteristics, although it decreases over the period under analysis. As for the household characteristics, the difference in endowments played against the HUR group, as well as it did the effect of coefficients in 1999. In sharp contrast, that effect was clearly negative in 2004, counterbalancing the one of differences in the endowment of household characteristics for that year. Finally,

the contribution of differences in population density was positive but moderate, and counterbalanced by a negative contribution of the difference in its coefficient in 1999 and 2004. In the last year under analysis, however, the net contribution of density was negative as the negative coefficient effect doubled the positive effect of the endowment.

Summing up, the results of the decomposition confirm the role played by regional differences in the coefficients of the observable characteristics. Its contribution is even more intense than the one due to differences in endowments. They also support the hypothesis that regional differences in individuals' education (both endowment and behavioral response) are a key ingredient to understand regional disparities in unemployment rates. In any case, it should be stressed that the gap attributable to differences in the constant term of the probabilistic model is very large. As we can assume that the constant term incorporates the effect of factors that do not vary across individuals within each group of regions, this result should be read as evidence favoring the combination of results from both a micro and an aggregate perspective.

5. ADDITIONAL RESULTS

In this section, firstly we discuss the results of the detailed decomposition of the regional unemployment rates gap when the proxy for the education of the active population is composed by a set of dummies accounting for the different levels of education, instead of the years of schooling. Although the interpretation of the contribution of education in this case is less straightforward, it allows assessing the effect attributable to the different types and levels of formal education.⁶ Secondly, given the well-known gender differences in characteristics and in the behavioural response in connection with unemployment, we decompose the male and the female regional unemployment rates gaps. Results of the decomposition can be though to vary if there exist significant regional differences between males and females in the distribution of characteristics and in their coefficients.

⁶ It should be noted that the use of the normalization of the probit equation suggested by Yun (2008) prevents the so-called identification problem of the contribution of the differences in the coefficients associated to the dummy variables. But still, the interpretation of the contribution of the coefficients of each of the categories should be made with caution as, for instance, the parametric constrains that the normalization imposes on the coefficients avoid all of them in one group to be higher or lower than in the other group (see Gardeazabal and Ugidos, 2004; page 1035).

Results of the decomposition when using the dummies for the educational levels are reported in Table 7. It is observed that the key message of the decomposition remains unaltered, as the overall contribution of endowments and coefficients, and the detailed contribution of the particular characteristics is similar in both cases, including that of the endowment of education. However, there is an outstanding difference in the effect attributable to the overall difference in the coefficients of education. As indicated in the previous section, the higher negative coefficient of education in the probit model for the HUR group makes this effect to be negative when using the years of schooling as the proxy for education. Now, the aggregate effect attributable to differences in coefficients associated to the dummies for the educational levels is positive in 1999 and in 2009. Such effect is only negative in 2004 and in any case of a magnitude much lower than the one obtained when using years of education.

A detailed analysis of the contribution of each of the categories of education reveal that the positive effect has to do with the lower educational levels, while a negative effect is observed for high school and tertiary education. In all, these results indicate that it is only the higher response of the probability of unemployment to the top levels of education in the HUR regions the reason behind the negative contribution of education reported in the previous section. Actually, the decrease in the contribution of this component in 2009 can also be explained by the reduction in the effect of those categories of education. Finally, a side effect of the analysis considering the educational levels is the decrease in the role assigned to the difference in the intercepts of the two groups of regions. Results suggest that the negative effect assigned to the coefficient of education in the previous section was compensated by increasing the positive effect corresponding to the intercept (perhaps because the homogenous effect that was imposed to years of schooling regardless of the level of education).

As for the decomposition by gender, the results are summarised in Tables 8 and 9, for men and women respectively. The general picture derived from those results is quite similar to the one obtained in the previous section for the entire population. Although the size of the gap varies by gender, both in absolute and relative terms, and also changes over time, the results of the overall decomposition is qualitatively similar to that reported previously in the analysis not accounting for differences in gender.

6. CONCLUDING COMMENTS

In this paper we have shown that the use of micro-data allows adding further evidence on the knowledge of regional disparities to that obtained from studies using aggregate regional data. It allows more detailed control of regional differences in the distribution of personal, household, job, firm, and other individual characteristics. And it does not impose similar return/effect for the characteristics across regions. Furthermore, the decomposition of the regional gap in the magnitude under analysis allows assessing the contribution of regional differences in characteristics and in coefficients. This is particularly important to analyze, for instance, the contribution of education in explaining regional disparities.

In the case of the regional gap in unemployment rates in Spanish the results confirm that they are large and persistent, and that differences in endowments of individual and household characteristics can only explain partially that gap. Actually, regional heterogeneity in the effect of the characteristics on the probability of unemployment account for as much as the explanation attributable to endowments. Among the characteristics considered in the analysis, our results confirm the important role played by differences in education, endowment and return, across regions. Homogenization of levels of education and of its return will have an effect on the regional unemployment gap, which nonetheless could be more complex than expected on a priori grounds. This is so because homogenization of the endowment of education across regions would reduce disparities in unemployment rates, but equalization of the behavioral response associated to education would be likely to increase the gap. The reason behind this counterintuitive result on a priori ground is related to the higher reduction in the chance of unemployment for the highest levels of education in the regions experiencing the highest unemployment rates. Therefore, a reduction in the magnitude of this effect in those regions to the levels in the regions with the lowest unemployment rates will even increase the unemployment rates in the first group of regions.

In any case, the large contribution assigned to the intercept of the probabilistic model suggests that the micro-analyses must be combined with evidence from aggregate data, in order to open the black-box behind the effect of the constant term. Improvements in

the analysis include the treatment of the likely endogeneity of education (through the consideration of instrumental variables using information about the effect of the Spanish Civil War and the post-war period, and the major change in the educational system in the seventies), sample selection (considering regional differences in participation rates, and its connection to education), and consideration of additional controls (industry, occupation, etc).

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Table 1. Unemployment rates in the Spanish regions.

	1999	2004	2009	Average
Spain	15,40%	11,08%	17,92%	11,52%
Andalucía	25,58%	17,43%	25,41%	18,46%
Aragón	9,69%	5,47%	13,01%	6,79%
Asturias	17,63%	10,42%	14,04%	11,12%
Balears	7,02%	9,14%	18,15%	8,64%
Canarias	13,70%	12,79%	25,74%	13,54%
Cantabria	14,96%	10,20%	11,70%	9,63%
Castilla y León	15,14%	10,93%	14,14%	10,63%
Castilla - La Mancha	15,09%	8,86%	19,52%	10,93%
Cataluña	10,54%	9,74%	15,87%	9,21%
Comunidad Valenciana	13,73%	10,18%	21,22%	11,29%
Extremadura	24,89%	17,94%	20,09%	17,60%
Galicia	16,28%	14,19%	12,93%	11,53%
Madrid	12,76%	6,81%	13,60%	8,47%
Murcia	14,04%	10,82%	20,16%	11,29%
Navarra	8,24%	5,38%	12,22%	6,19%
País Vasco	13,92%	9,50%	10,51%	9,17%
La Rioja	6,65%	4,86%	12,74%	6,97%

Table 2. Unemployment rates in the two macro-regions

	1999	2004	2009	Average
Spain	15,40%	11,08%	17,92%	11,52%
Region HUR	25,50%	17,49%	24,82%	18,36%
Region LUR	8,88%	5,36%	12,75%	6,65%

Table 3. Description of some characteristics in the two macro-regions

	1999		2004		2009							
	REGION HUR		REGION LUR		REGION HUR		REGION LUR					
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.				
Age												
16_19	0,04	(0,21)	0,03	(0,16)	0,03	(0,18)	0,02	(0,13)	0,03	(0,17)	0,02	(0,14)
20_24	0,13	(0,34)	0,10	(0,30)	0,11	(0,31)	0,09	(0,28)	0,09	(0,29)	0,07	(0,25)
25_29	0,15	(0,36)	0,14	(0,34)	0,14	(0,35)	0,12	(0,32)	0,12	(0,33)	0,10	(0,30)
30_34	0,14	(0,35)	0,13	(0,34)	0,13	(0,34)	0,14	(0,35)	0,13	(0,33)	0,13	(0,33)
35_39	0,14	(0,35)	0,14	(0,35)	0,14	(0,35)	0,14	(0,34)	0,14	(0,34)	0,14	(0,35)
40_44	0,12	(0,33)	0,13	(0,34)	0,14	(0,34)	0,15	(0,36)	0,14	(0,35)	0,15	(0,36)
45_49	0,10	(0,29)	0,12	(0,32)	0,11	(0,32)	0,13	(0,34)	0,14	(0,34)	0,14	(0,35)
50_54	0,08	(0,28)	0,11	(0,31)	0,09	(0,28)	0,10	(0,30)	0,11	(0,31)	0,12	(0,32)
55_59	0,06	(0,23)	0,07	(0,26)	0,06	(0,25)	0,08	(0,27)	0,07	(0,26)	0,09	(0,29)
60_64	0,03	(0,17)	0,03	(0,17)	0,04	(0,19)	0,04	(0,19)	0,04	(0,20)	0,05	(0,21)
Educational Att.												
Years Schooling	8,71	(4,24)	9,77	(4,14)	9,44	(4,19)	10,55	(4,03)	9,90	(3,95)	10,97	(3,88)
No Schooling	0,11	(0,31)	0,02	(0,12)	0,06	(0,24)	0,01	(0,10)	0,04	(0,21)	0,01	(0,10)
Primary	0,24	(0,43)	0,27	(0,44)	0,20	(0,40)	0,18	(0,39)	0,13	(0,33)	0,12	(0,32)
First Second	0,29	(0,46)	0,24	(0,43)	0,30	(0,46)	0,24	(0,43)	0,36	(0,48)	0,25	(0,43)
High School	0,09	(0,28)	0,10	(0,30)	0,10	(0,30)	0,11	(0,32)	0,11	(0,31)	0,14	(0,35)
Voc Training 1st level	0,05	(0,23)	0,08	(0,27)	0,08	(0,26)	0,10	(0,30)	0,09	(0,28)	0,11	(0,31)
Voc Training 2nd level	0,07	(0,26)	0,10	(0,30)	0,06	(0,24)	0,11	(0,32)	0,08	(0,28)	0,12	(0,32)
University 1st level	0,08	(0,27)	0,11	(0,31)	0,09	(0,29)	0,12	(0,33)	0,10	(0,30)	0,12	(0,33)
University 2nd level	0,07	(0,26)	0,09	(0,29)	0,09	(0,29)	0,12	(0,32)	0,09	(0,29)	0,13	(0,33)
Household Char.												
N members	4,07	(1,41)	3,63	(1,28)	3,76	(1,31)	3,37	(1,20)	3,51	(1,25)	3,24	(1,17)
Head of household	0,43	(0,49)	0,46	(0,50)	0,44	(0,50)	0,46	(0,50)	0,43	(0,50)	0,46	(0,50)
N children	0,70	(0,91)	0,53	(0,80)	0,62	(0,86)	0,51	(0,81)	0,60	(0,83)	0,57	(0,84)
Children under 9	0,27	(0,45)	0,22	(0,42)	0,25	(0,44)	0,23	(0,42)	0,26	(0,44)	0,24	(0,43)
Another employee	0,83	(0,87)	0,96	(0,85)	0,91	(0,90)	0,99	(0,84)	0,82	(0,79)	0,93	(0,77)
N Obs	17092		6233		16284		6113		16057		6837	

Table 4. Unemployment rates within categories of characteristics

	1999		2004		2009	
	REGION HUR	REGION LUR	REGION HUR	REGION LUR	REGION HUR	REGION LUR
Gender						
Male	19,40%	5,08%	12,67%	4,05%	23,42%	12,91%
Female	36,55%	15,68%	25,53%	7,46%	27,30%	12,78%
Nacionality						
Spanish	25,85%	8,65%	17,75%	4,81%	24,32%	10,00%
Inmigrant	21,04%	29,00%	16,15%	11,56%	31,58%	27,35%
Age						
16_19	48,35%	21,15%	36,80%	21,05%	62,35%	51,74%
20_24	39,06%	14,59%	26,99%	11,32%	40,64%	30,18%
25_29	31,22%	13,57%	20,48%	8,33%	29,61%	14,49%
30_34	23,87%	7,32%	16,63%	5,53%	23,03%	12,11%
35_39	21,77%	6,57%	14,27%	4,67%	22,12%	13,46%
40_44	19,42%	7,37%	14,20%	4,05%	20,90%	10,74%
45_49	17,30%	7,52%	14,55%	2,64%	19,78%	9,93%
50_54	16,47%	5,43%	13,80%	2,95%	19,42%	7,47%
55_59	22,95%	7,39%	14,63%	1,96%	20,65%	7,00%
60_64	19,19%	3,33%	12,52%	2,77%	16,32%	4,59%
Educational Att.						
No Schooling	32,56%	14,64%	24,84%	8,32%	36,84%	35,70%
Primary	26,46%	7,41%	18,91%	5,23%	33,57%	17,16%
First Second	27,51%	9,12%	20,64%	5,31%	30,90%	16,97%
High School	25,42%	13,02%	13,99%	5,23%	18,87%	13,25%
Voc Training 1st level	29,51%	9,41%	19,99%	3,63%	24,12%	13,84%
Voc Training 2nd level	24,53%	7,01%	14,64%	7,00%	18,72%	9,49%
University 1st level	17,71%	8,47%	10,39%	6,25%	13,36%	5,81%
University 2nd level	14,33%	10,20%	11,73%	4,94%	10,76%	6,46%
Marital Status						
Single	35,52%	12,75%	23,25%	8,32%	32,55%	18,65%
Married	19,77%	6,68%	14,20%	3,85%	20,65%	9,47%
Widowed	20,54%	10,05%	15,18%	2,70%	24,91%	14,31%
Divorced	28,24%	10,30%	17,85%	4,67%	23,96%	14,03%
Household Char.						
Head of household (=Y)	13,89%	4,50%	10,14%	3,18%	20,69%	10,66%
Head of household (=N)	34,98%	12,76%	23,58%	7,40%	28,50%	14,71%
Children (=Y)	22,72%	8,23%	15,82%	5,38%	23,99%	13,17%
Children (=N)	28,37%	9,44%	18,98%	5,43%	25,85%	12,67%
Another employee (=Y)	26,16%	9,82%	17,55%	5,60%	23,56%	11,84%
Another employee (=N)	25,24%	7,12%	17,89%	4,94%	27,65%	15,27%

Table 5. Marginal Effects from the probit model

	1999		2004		2009	
	HUR	LUR	HUR	LUR	HUR	LUR
male	-0,1453 ***	-0,0816 ***	-0,1147 ***	-0,0280 ***	-0,0670 ***	-0,0157 **
Spanish	-0,0305	-0,1384 ***	0,0029	-0,0487 ***	-0,0596 ***	-0,1103 ***
e20_24	-0,0534 ***	-0,0257 *	-0,0365 **	-0,0194 *	-0,0969 ***	-0,0439 **
e25_29	-0,0861 ***	-0,0261 *	-0,0523 ***	-0,0320 ***	-0,1375 ***	-0,0847 ***
e30_34	-0,1116 ***	-0,0468 ***	-0,0722 ***	-0,0426 ***	-0,1663 ***	-0,0917 ***
e35_39	-0,1282 ***	-0,0569 ***	-0,0956 ***	-0,0412 ***	-0,1800 ***	-0,0914 ***
e40_44	-0,1538 ***	-0,0514 ***	-0,0971 ***	-0,0428 ***	-0,1926 ***	-0,1029 ***
e45_49	-0,1650 ***	-0,0558 ***	-0,0944 ***	-0,0463 ***	-0,2022 ***	-0,1039 ***
e50_54	-0,1650 ***	-0,0531 ***	-0,0923 ***	-0,0403 ***	-0,2009 ***	-0,1066 ***
e55_59	-0,1142 ***	-0,0367 **	-0,0810 ***	-0,0411 ***	-0,1922 ***	-0,1026 ***
e60_64	-0,1574 ***	-0,0503 ***	-0,1054 ***	-0,0376 ***	-0,2085 ***	-0,1013 ***
Schooling	-0,0167 ***	-0,0022 **	-0,0140 ***	-0,0009	-0,0237 ***	-0,0099 ***
Single	0,0438 ***	0,0319 ***	0,0414 ***	0,0169 **	0,0454 ***	0,0339 ***
Widowed	-0,0389	0,0469	-0,0077	0,0021	0,0432	0,0770 **
Divorced	0,0291	0,0479 **	0,0152	0,0171	0,0318 **	0,0371 **
N members	0,0228 ***	0,0042	0,0035	0,0004	0,0211 ***	0,0081 *
Head Household	-0,1036 ***	-0,0224 **	-0,0717 ***	-0,0162 **	-0,0161 **	-0,0062
N children	-0,0141 **	0,0086	0,0035	0,0080	-0,0268 ***	-0,0018
Children under 9	-0,0050	-0,0114	0,0002	-0,0037	0,0297 **	0,0020
Another employee	-0,0608 ***	-0,0073	-0,0348 ***	-0,0042	-0,0536 ***	-0,0158 ***
Density	0,0002 ***	0,0003	0,0001	0,0001	0,0002 ***	0,0005 **
Obs	17092	6233	16284	6113	16057	6837
LR (chi2)	1965,16	319,06	1302,15	176,79	1594,72	523,55
prob>chi2	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

Note: marginal effects computed in the corresponding sample average of each group of regions

Table 6. Unemployment rate gap decomposition (years of Schooling)

Gap	1999		2004		2009	
	0.1677		0.1225		0.1222	
	Endowment Coefficient		Endowment Coefficient		Endowment Coefficient	
Overall	0.0496	0.1181	0.0298	0.0926	0.0481	0.0742
Education	0.0156	-0.0766	0.0145	-0.0758	0.0224	-0.0378
Age	0.0065	<i>0.0003</i>	0.0039	0.0032	0.0082	0.0005
Other Personal Ch.	0.0003	0.0838	-0.0009	0.0292	-0.0036	0.0239
Household Ch.	0.0183	0.0218	0.0065	-0.0254	0.0102	0.0077
Density	0.0089	-0.0105	0.0059	-0.0053	0.0108	-0.0231
Intercept		0.0994		0.1667		0.1030

Note: Contributions no significantly different from zero in italics.

Table 7. Unemployment rate gap decomposition (levels of education)

Gap	1999		2004		2009	
	0.1677		0.1225		0.1222	
	Endowment Coefficient		Endowment Coefficient		Endowment Coefficient	
Overall	0.0514	0.1163	0.0309	0.0915	0.0495	0.0728
Education	0.0165	0.0081	0.0156	-0.0028	0.0240	0.0059
No Schooling	0.0138	0.0001	0.0059	0.0006	0.0053	-0.0004
Primary	-0.0019	0.0101	0.0015	0.0014	0.0010	0.0040
First Second	0.0001	0.0038	0.0023	0.0065	0.0075	0.0057
High School	<i>0.0000</i>	-0.0027	0.0006	-0.0002	0.0020	-0.0004
Voc Training 1st level	-0.0004	0.0024	-0.0002	0.0051	0.0001	-0.0007
Voc Training 2nd level	0.0008	0.0025	0.0014	-0.0040	0.0012	0.0006
University 1st level	0.0024	-0.0018	0.0028	-0.0084	0.0023	0.0004
University 2nd level	0.0018	-0.0064	0.0013	-0.0037	0.0048	-0.0034
Age	0.0074	-0.0006	0.0038	0.0029	0.0079	0.0007
Other Personal Ch.	0.0003	0.0818	-0.0010	0.0280	-0.0041	0.0228
Household Ch.	0.0185	0.0184	0.0066	-0.0219	0.0102	0.0100
Density	0.0087	-0.0110	0.0060	-0.0037	0.0115	-0.0216
Intercept		0.0197		0.0890		0.0550

Note: Contributions no significantly different from zero in italics.

Table 8. Unemployment rate gap decomposition for males (years of Schooling)

	1999		2004		2009	
	HUR	LUR	HUR	LUR	HUR	LUR
Unempl. rate	0.1939	0.0508	0.1267	0.0407	0.2338	0.1285
Gap	0.1431		0.0860		0.1054	
	Endowment Coefficient		Endowment Coefficient		Endowment Coefficient	
Overall	0.0318	0.1114	0.0222	0.0638	0.0443	0.0610
Education	0.0118	-0.0709	0.0099	-0.0529	0.0206	-0.0504
Age	0.0020	0.0008	0.0008	0.0041	0.0054	0.0016
Other Personal Ch.	-0.0002	0.0228	-0.0008	0.0240	-0.0064	0.0255
Household Ch.	0.0101	0.0145	0.0044	0.0257	0.0081	-0.0133
Density	0.0081	-0.0084	0.0080	-0.0251	0.0166	-0.0251
Constant		0.1526		0.0880		0.1227

Note: Contributions not significantly different from zero in italics.

Table 9. Unemployment rate gap decomposition for females (years of Schooling)

	1999		2004		2009	
	HUR	LUR	HUR	LUR	HUR	LUR
Unempl. rate	0.3648	0.1567	0.2552	0.0746	0.2728	0.1276
Gap	0.2082		0.1806		0.1451	
	Endowment Coefficient		Endowment Coefficient		Endowment Coefficient	
Overall	0.0780	0.1301	0.0437	0.1369	0.0497	0.0954
Education	0.0225	-0.0912	0.0211	-0.0931	0.0235	-0.0258
Age	0.0141	-0.0008	0.0103	0.0034	0.0124	-0.0007
Other Personal Ch.	0.0001	0.1719	0.0010	0.0316	-0.0001	0.0237
Household Ch.	0.0300	0.0175	0.0082	-0.0556	0.0108	0.0114
Density	0.0113	-0.0187	0.0030	0.0149	0.0031	-0.0213
Constant		0.0514		0.2358		0.1081

Note: Contributions not significantly different from zero in italics.

Figure 1. Spatial distribution of unemployment rates (%)

