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The Geography of Internal Migration Areas in Spain (1988-2008): a Spatial Econometric Approach[1]

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Abstract:

The study we present here aims to clarify the more contemporary evolution of the migratory areas in Spain during the last two decades, for which we will use spatial econometric techniques. We intend to offer a vision of the whole of Spain as a dynamic system where internal migrations create spaces that fluctuate, that expand and that contract depending on the relevant factors that are to be identified and will constitute the object of analysis in this work.

Territorial units of analysis are the Spanish municipalities and the data come from the series of *Estadística de Variaciones Residenciales* (Municipality changes of residence). The data contain individual migratory annual flows and are elaborated by the National Institute of Statistics. Our analysis covers the period from 1988 to 2008. We present the results of an analysis of the migration rates by age using Exploratory Spatial Data Analysis (ESDA). The main objective is to study internal migration trends by type of migration (short, medium and large distance) and to identify significant spatial clusters. In addition, we use a classification of areas based on the Spanish Census of 1991 and 2001 in order to make the analysis more accurate. This classification synthesizes the results and provides a cartography which shows the evolution of the internal migration areas during two decades.
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Background:

At the end of the fifties, after a period of economic stagnation as a consequence of the Spanish Civil War, the second important internal migration cycle of the XXth century in Spain is initiated. This is the longest and most intense one, and it is characterised by the movement of numerous contingents of population from the rural areas to the cities and areas of higher economic growth. The massive emigration of the young people, in search of labour opportunities and better life conditions, originated a rural exodus that emptied extensive territorial areas in the interior of the Iberian Peninsula. This process was determinant for the deep and continuous depression of the local demographic systems trough the fall of nuptiality, aggravated by a major emigratory tendency of the rural females, and the following decrease of fertility.

The urban areas experienced the reverse process. This situation, which extends from the fifties up to the middle of the seventies, is characterised by the stability of the migration spatial patterns. Two types of regions are distinguished: the sending ones that correspond to large centre areas, Northwest and South of the peninsula and the receiving ones, located in industrial and urban sectors. On the contrary, the seventies mean a rupture of the prevailing pattern in the internal migrations and a redistribution of the roles played by the different Spanish regions. This new model is typified by: a) the simultaneous decrease of the exits from the rural areas to the industrial and urban settings; b) the reversing of the flows that is materialized by the appearance of a return migration from de regions that were previously emigratory ones to the areas that had received a great deal of the immigration during the previous decades; c) a dispersion of the destinations, that is summed up in a major protagonist role of the secondary migratory poles, located in the new areas of economic development of the Mediterranean coast and the Ebro Valley.

The weight of the sending regions in the migratory process has been reduced at present. However, we cannot affirm that the consequences have already finished. The study we present here aims to clarify the more contemporary evolution of the sending areas through some spatial econometric techniques. We intend to provide a vision of the whole of Spain as a dynamic system where the internal migrations create spaces that fluctuate, expand and contract depending on the relevant factors that are to be identify and that will constitute the object of analysis in this work.

Data and methods:

We will use data derived from the microdata files of the population registers: migratory flows have been collected from the *Estadística de Variaciones Residenciales* in Spain for the period 1988-2008. The classification of areas will be based on the 1991 and 2001 Spanish Censuses.

Our proposal is to analyse the spatial dependence of data through Exploratory Spatial Data Analysis (ESDA). To this end, we will use global and local indicators of autocorrelation statistics to evaluate the degree of spatial association at both scales. Spatial statistics offer a tool for analysing data and evaluate the existence of clusters of a given variable that is distributed within the territory.

Before proceeding to the spatial autocorrelation analysis it is nonetheless necessary to establish a clear criterion to define and identify neighbouring entities. On the basis of these criteria, a spatial weights matrix is constructed, relating each entity to all of the other entities in the territory. This matrix allows (for) the calculation of spatial association indicators.

For global spatial autocorrelation analysis we use the Global Moran I, a statistic that is calculated (through) from the formula (Anselin, 1995):

$$I = \frac{N \cdot \sum_{i=1}^{N} \sum_{j=1}^{N} w_{ij} \cdot \left(x_i - \overline{x}\right) \cdot \left(x_j - \overline{x}\right)}{S_o \cdot \sum_{i=1}^{N} \left(x_i - \overline{x}\right)^2} \qquad i \neq j$$

Where $\boldsymbol{x}_i$ is the value of the quantitative variable $\boldsymbol{x}$ in spatial unit i; $\overline{x}$ is its mean; $\boldsymbol{w_{ij}}$, are the weights of matrix $\boldsymbol{W}$; $\boldsymbol{N}$ is the sample size, and $\boldsymbol{S}_0 = \sum_{\boldsymbol{i}} \sum_{\boldsymbol{j}} \boldsymbol{w_{ij}}$, is the sum of the weights. This indicator gives an idea of the scale and type of the spatial association in terms of the variable being analysed. Once calculated, a global autocorrelation test is carried out in which the null hypothesis is the spatial independence of the variable (the values of one variable do not depend on those of its neighbours).

In the other type of spatial autocorrelation analysis, for the local scale, the calculation is made with the Local Moran I. The mathematical formula for this indicator is given by spatial unit i in the following formula:

$$\boldsymbol{I_i} = \frac{\boldsymbol{z_i}}{\sum_{\boldsymbol{i}} \boldsymbol{z_i^2} \big/ \boldsymbol{N}} \sum_{\boldsymbol{j \in J_i}} \boldsymbol{w_{ij} z_j}$$

where z_i is the value of entity i of the normalised variable and J_i is the total number of spatial units in the immediate neighbourhood of municipality i. The weights of matrix $\boldsymbol{W}$, as in the case of the previously commented indicator, are $\boldsymbol{w_{ij}}$. By calculating this local indicator, it is possible to determine the positive spatial autocorrelation (high values of one variable surrounded by high values, and low values surrounded by low values) and the negative spatial autocorrelation (high values of one variable surrounded by low values, and low values surrounded by high values). A positive spatial autocorrelation therefore indicates the presence of clusters of similar values within the territory and offers information that can help us to identify patterns of internal migration.

Summary of preliminary findings:

Our research is currently in progress, but some preliminary findings and conclusions can be advanced at this point. First, we have examined the evolution of internal migration during 1988-2005. Results show that internal migration has increased over time across most of the territory. Second, we have analysed the spatial autocorrelation of internal migration rates in Spain according to four economic phases (1989-1992, 1995-1997, 1998-2001 and 2002-2005). As an example of this analysis, there are clusters of municipalities that systematically show very low migration rates compared to other parts of territory with higher rates. Moreover, the clusters with low migration rates increased over time more than the clusters with high migration rates (see Table 1 and Figure 1). Our objective is to explore these preliminary findings and we expect to prove the hypothesis that there is a relationship between internal migration and economic phases in Spain and to extend this analysis to recent flows (2006-2008).

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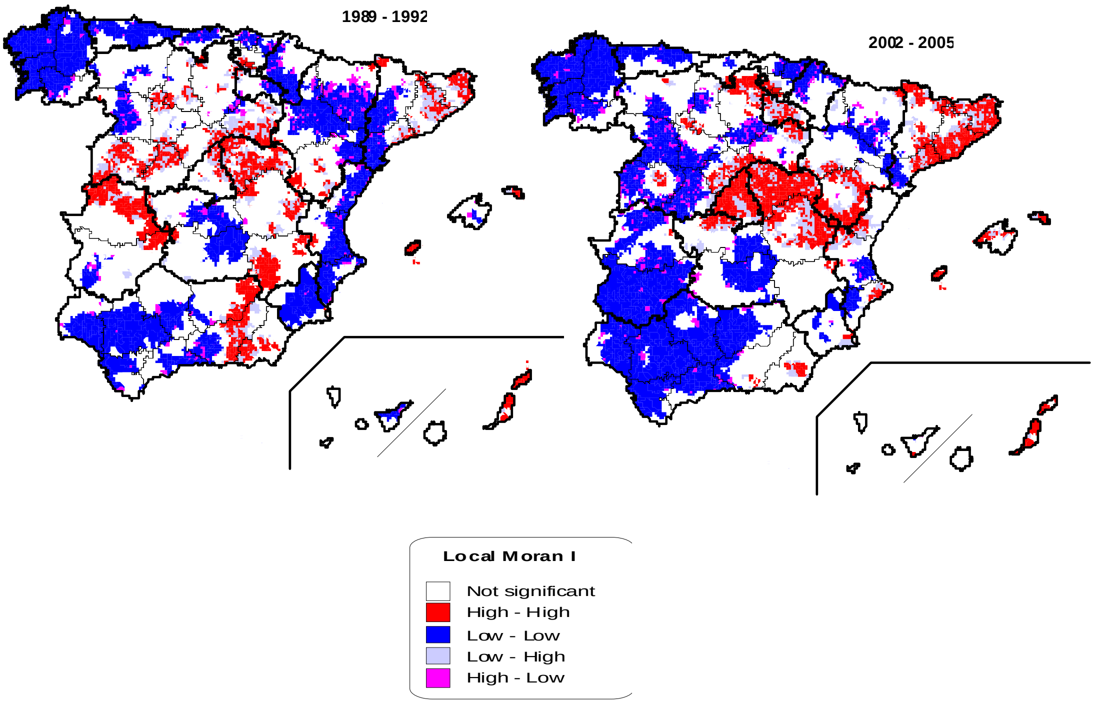
Table 1: Local Indicador of Spatial Association (Moran I) of internal migration rates. Evolution of the percentage of surface by type of spatial autocorrelation and period. Spain (1989-2005)

		Not significant	Positive spatial autocorrelation		Negative spatial autocorrelation		Total
			High - High	Low - Low	Low - High	High - Low	
1989-1992	Area Km^2	268.096	58.937	135.138	29.051	13.405	504.627
	%	53,1	11,7	26,8	5,8	2,7	100
1995-1997	Area Km^2	295.429	41.302	125.740	27.076	15.080	504.627
	%	58,5	8,2	24,9	5,4	3,0	100
1998-2001	Area Km^2	249.765	51.347	161.096	24.347	18.072	504.627
	%	49,5	10,2	31,9	4,8	3,6	100
2002-2005	Area Km^2	218.957	66.708	171.565	32.326	15.071	504.627
	%	43,4	13,2	34,0	6,4	3,0	100

Source: National Statistics Institute; 1991 Census microdata, Municipal Register 1996-2004, Residential Variation Statistics 1988-2005.

Figure 1: Local Indicador of Spatial Association, Moran I. Internal migration rate, Spain (1989-2005)



Source: National Statistics Institute; 1991 Census microdata, Municipal Register 1996-2004, Residential Variation Statistics 1988-2005.