Concentration of the Economic Activity: Comparing Methodologies and Geographic Units

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Abstract:

The purpose of the present paper is twofold. First, we are interested in analyzing the sectoral concentration of economic activity in Catalonia using the municipality and the Local Labour Systems (LLS) as the geographic units of the analysis. We study the level of concentration and location pattern of both manufacturing and service sectors for 1991 and 2001, using different indices proposed in the literature. As a second step, specialization measures and the techniques of the Exploratory Spatial Data Analysis let us study the degree of specialization of the municipalities in Catalonia in order to see if a random distribution exists or if, on the contrary, closer regions tend to show similar specialization patterns.

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1. Introduction

One of the most relevant characteristics of the economic activity is that it normally appears to be concentrated in the space. Among the high variety of examples that we could underline, the concentration of high-tech industries in Silicon Valley (US) or the automobile industry in Detroit appear to be as two of the most cited. Although this field has been the focus of important attention during the last decades, both considering the theoretical development and the political actions trying to emulate Silicon Valley-style agglomerations, Alfred Marshall's (1890) *Principles* pointed out the existence of external economies leading to the formation of industrial agglomerations. Thanks to the work of Krugman (1991a,b), the study of

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agglomerations of economic activity has emerged as a central issue among economists and economic geographers. Moreover, the work of Krugman is followed by several publications (Krugman and Venables (1995, 1996), Venables (1996), among others) that will form the central axis of the New Economic Geography (NEG).

The vast majority of studies, both at international and national level, have focused their attention to the analysis of the location and the determinants of the geographic concentration of manufacturing sectors. Ellison and Glaeser (1997), Maurel and Sédillot (1999) and Duranton and Overman (2005), among others, have proposed different indices to measure the degree of concentration of the economic activity, obtaining results for the manufacturing industry of Unites States, France and United Kingdom, respectively. Another type of articles is oriented towards the analysis of the causes that could be behind the existence of industrial agglomerations (Amiti (1999), Haaland et al (1999) and Rosenthal and Strange (2001), among others, at the international level, and Tirado et al (2002) at the Spanish level). This greater attention to the industrial sector has been motivated by questions of data availability as well as by the fact that the study of manufacturing sectors is of particular interest due to a higher risk of relocalization, motivated in part by a major tradability of industrial products.

However, as noted by Midelfart-Knarvik et al (2000), "as service industries account for around 60% of EU employment, the geography of those services must be increasingly important". For 2003, the value-added (as a percent of the Gross Domestic Product –GDP–) corresponding to the activities of the service sectors of the European Monetary Union (EMU) accounted for 69.98%, being the general tendency among the developed countries one of constant increase. Among the reasons that could be behind this growth of the service sector's participation in the GDP, we could find the rise of the income levels across EU countries, the fact that most manufacturing sectors have become more intensive users of services as intermediates in production and, also, the fact that the manufacturing industries that have been amongst the fastest growing are also those industries considered as highly service intensive industries (Midelfart-Knarvik et al, 2000).

The lack of data for the service sectors let us with a very few number of works studying the concentration and the pattern of location of this part of the economic activity. At an international level, Midelfart-Knarvik et al (2000) and Hallet (2000) study the concentration of the service sector with a level of disaggregation of only 5 sectors for the EU-15 and 119 European regions, respectively (Financial services, Insurance, Real Estate and Business Services; Wholesale and Retailing; Restaurants and Hotels; Transport; and Communication). Krugman specialization index and the Gini Coefficient are used by the former author in order to assess the degree of specialization of the EU15 and the concentration of sectors, respectively. Hallet (2000) proposes four indicators to measure the spatial dispersion of production regarding concentration, clustering, centrality and income. Braunerhjelm and Borgman (2004) use the Ellison and Glaser (EG) index to examine empirically the degree of concentration in the production of goods and services at a 2-digit and 4-digit level of disaggregation according to the International Standard Industrial Classification (ISIC) system, for the LLS of Sweden.

For the Spanish case, we have been unable to find an article studying both the concentration of manufacturing and service activities. Callejón (1997) uses the *EG index* to measure the geographic concentration of the Spanish industry with employment data for 30 industrial sectors and 50 provinces, but she herself is aware that an analysis with a higher level of sectoral disaggregation is needed in order to perform a discrimination of the different patterns of location amongst sectors. Alonso-Villar et al (2003 and 2004) use the index proposed by Maurel and Sédillot (*MS*) at a 3-digit level of sectoral disaggregation (108 industrial sectors) but using as the geographic unit of the analysis the NUTS-2 level (Comunidades Autónomas). The computation of indices of concentration for such a vast area is problematic for two main reasons. First, we have to bear in mind the fact that NUTS-2 are regions not determined by economic reasons but by administrative borders. Second, concentration usually takes place at an inferior geographic level. Santa María et al (2005) perform an analysis based in the methodology proposed by O'Donoghue and Gleave (2004) at the municipality level and at a very disaggregated sectoral level (103 industrial sectors), but they fail to take into account spatial proximity. Viladecans (2004) is aware of this fact and uses the *Moran's I* statistic of spatial autocorrelation in order to incorporate the neighbouring areas of the municipalities in the computation of the geographic level of concentration of manufacturing activities. However, she performs the analysis with only 19 sectors for the municipalities of Spain with more than 15000 inhabitants.

Fratesi (2004) points out what a complicated issue could be the choice of the sectoral scale in which to measure and explain localisation: "if used at a sectoral scale different from those underlying economic processes, the measures have no real economic meaning".

The problem concerning the use of geographic units based on administrative borders in the calculation of several indices of concentration has been recently discussed in this kind of literature. Duranton and Overman (2005) criticize that this type of measures "still ex-ante allocate establishments (i.e. points located on a map), to counties, regions or states (i.e. spatial units at a given level of aggregation). In other words, *they transform dots on a map into units in boxes*"; a fact that implies throwing away a large amount of information, restricting the analysis to only one spatial scale and working with spatial units defined according to administrative needs, not economic relevance. Distance-based methods, as those proposed by Duranton and Overman (2005) or Marcon and Puech (2003), appear as an alternative way to measure the concentration of economic activity, but a high level of data requirement, (data for every establishment in the area under study is needed), makes the computation of distance-based indices and the comparison of results between different countries a difficult task. Thus, the use of LLS as a geographic unit based not on administrative borders but on economic relevance (commuting flows) appears to be as the best way to deal with the problem of spatial scale when the data requirements needed to compute distance-based indices are not available. At the international level, Braunerhjelm and Borgman (2004) are the first ones in analysing these issues at this level of aggregation.

The purpose of the present paper is twofold. First, we are interested in analyzing the sectoral concentration of economic activity in Catalonia; that is, the level of concentration and location pattern of both manufacturing and service sectors, using different indices proposed in the literature. The analysis will use the municipalities and the LLS of Catalonia as the geographic units used to calculate the indices, in order to overcome the problem of spatial scale that we have mentioned above. As a second step, the techniques of the Exploratory Spatial Data Analysis let us study the degree of specialization of both the municipalities and the LLS in Catalonia in order to see if a random distribution exists or if, on the contrary, closer municipalities or LLS tend to show similar specialization patterns. These indices will be computed for two years highly enough separated in time, 1991 and 2001, as to see the general tendency of concentration and specialization in Catalonia. We have to point out that the testing of models of economic geography or the study of the determinants of agglomeration is not amongst the objectives of the present study, being our primary intention to provide a faithful description of the geographical concentration of economic activity in Catalonia as well as a comparison of the results using different indices of concentration and specialization and different geographic units, for a wide period of time.

In this sense, our article works with a considerable high level of sectoral disaggregation (60 sectors), a geographic unit of analysis, the LLS, that has real economic meaning, and a database containing information not only about manufacturing employment but employment on the service sectors as well, that will permit us to shed some light on the geographic distribution of overall economic activity.

To our knowledge, the analysis of the concentration of the service sectors as well as the computation of some of the indices that we are going to analyze in this article is a novelty in

Spain. Moreover, the high level of disaggregation both at the geographical and sectoral level will constitute an advantage in front of other related literature at the Spanish level. Finally, we will consider the spatial scope of the indices by using the techniques of the Exploratory Spatial Data Analysis.

The rest of the paper is organised as follows. The next section outlines the methodology and section 3 describes the data. Section 4 presents the results and section 5 concludes.

2. Methodology

Duranton and Overman (2002) presented five requirements that a satisfactory index of spatial concentration should rely on[5]:

1. Any index should be comparable across industries;
2. Control for the overall agglomeration of manufacturing (or the overall agglomeration of economic activity in our case);
3. Purging spatial concentration from industrial concentration;
4. Be unbiased with respect to scale and aggregation, and;
5. Give an indication of the significance of the results.

The measures of concentration and specialization that we will compute in this article try to capture complementary information in order to fulfil these five requirements.

Concentration measures

The first measure that we calculate is a simple one: the *index of relative concentration* of the industry j, which fulfils the first two requirements. The index is given by:

$$L_j = \frac{1}{2}\sum_{i=1}^{N}\left|\frac{Y_{ij}}{Y_j} - \frac{Y_i}{Y}\right|, \qquad (1)$$

where Y_{ij} is the employment in sector j and municipality i, Y_i represents total employment of municipality i, Y_j contains the total employment of sector j, and Y is the total employment in Catalonia. This index varies between 0 and 1, and measures the differences for all municipalities between their respective participation in total employment of industry j and the share of their employment in total employment. The index will be equal to 0 if the employment's share of industry j in municipality i is always equal to the employment's share of industry j in total employment; that is, in this situation it does not exist regional concentration of industry j.

[5] For an extended revision of what implies each requirement and what indices fulfil the different properties, see Bertinelli and Decrop (2005).

Locational Gini Indices developed by Krugman (1991a), fulfil the same properties as the index described above, but we compute the measure because its popularity will allow us to compare the results obtained for Catalonia with those obtained for other economies. The Locational Gini index is a summary measure of spatial dispersion derived from a spatial Lorenz curve. Formally, the locational Gini coefficient for an industry *j*, used by Guillain et al (2005) is calculated as (Kim et al, 2000):

$$G_j = \frac{\Delta}{4\overline{\mu}_x}, \qquad (2)$$

with: $\Delta = \frac{1}{n(n-1)}\sum_{i=1}^{n}\sum_{m=1}^{n}\left|x_i - x_m\right|$,

$$x_{i(m)} = \frac{\text{Commune } i\text{'s } (m\text{'s}) \text{ share of employment in } j}{\text{Commune } i\text{'s } (m\text{'s}) \text{ share of total employment}},$$

$\overline{\mu}_x$ is the mean of $x_i : \overline{\mu}_x = \sum_{i=1}^{n} x_i / N$,

where *N* is the number of municipalities and *i* and *m* are indices for municipalities ($i \neq m$). The locational Gini coefficient has a value of zero if employment in industry *j* is distributed identically to that of total employment (that is, if the total employment of sector *j* equals the total employment share), and a value of 0.5 if industry employment is totally concentrated in one municipality. Locational Gini coefficients have the advantage of its ease of computation and its limited data requirements, but fail to account for industrial concentration (third requirement).

The *EG index* (Ellison and Glaeser, 1997) has been widely used in several studies because of its properties. In particular, it improves the results of the other two indices mentioned above by applying the third requirement of those proposed by Duranton and Overman (2002). That is, the EG index purges spatial concentration from industrial concentration, by using the well-known index of industrial concentration: the Hirschman-Herfindhal index. By doing so, they are trying to separate the part of the concentration of economic activity that is due to industrial concentration (for instance, a sector where the 80% of workers are employed by two big firms) from the part of concentration that is explained thanks to agglomerative forces[6]. The EG index is computed as follows:

[6] The EG index determines the degree of concentration of a particular sector after purging from industrial concentration, but does not indicate the origin of this excessive concentration that a particular economic activity has. They only point out that plants locate together either to benefit from local natural advantages or to internalize externalities from other establishments.

$$EG_j = \frac{G_j - \left(1 - \sum_i x_i^2\right) H_j}{\left(1 - \sum_i x_i^2\right)\left(1 - H_j\right)}, \qquad (6)$$

with $G_j = \sum_i (s_i - x_i)^2$ and $H_j = \sum_l z_l^2$,

where s_i is the share of a particular industry in municipality i, x_i is the share of aggregate employment in municipality i, G_j is an index of raw geographic concentration of industry j and H_j is the Hirschman-Herfindhal index for the industry j, being l the number of plants in this particular industry.

When computing the EG index three different outcomes could be obtained. The measure could display negative values when the economic activity of a particular sector is, after purging from industrial concentration, less concentrated than overall employment; a value near to zero indicates a level of agglomeration similar to that of the overall economic activity and, finally, positive values of the EG index reveal the existence of agglomerative forces for a particular sector.

Hallet (2000) proposed other indices that complement these measures and have the advantages of its ease of computation and limited data requirements, capturing different aspects of location. We have to acknowledge that the respective branch value of these new measures is always set in relation to GDP value in order to standardise the results and to eliminate business cycle effects. In our case, and due to a lack of GDP data at the municipality level, we will standardise the results by comparing the results for one particular sector with the distribution of earnings declared by the contributors in the income tax (IRPF) in Catalonia.

The measures exposed above are frequently criticized because they do not account for spatial proximity. The *clustering measure* proposed by Hallet (2000) tries to overcome this fact by introducing the use of distances between municipalities. This measure is based on the gravity model by summing up the distance-weighted production of all pairs of municipalities and analyzes if the employment of sector j is more concentrated in close municipalities in the geographical space than total average earnings (IRPF). The computation of the index is done as follows:

$$C^j = \frac{\sum_i \sum_m \left(\frac{y_i^j y_m^j}{\delta_{im}}\right)}{\sum_i \sum_m \left(\frac{y_i y_m}{\delta_{im}}\right)} \quad \text{with } i \neq m, \qquad (3)$$

where y_i^j is the employment of branch *j* in municipality *i* relative to the total employment of Catalonia in branch *j*; y_i is the total declared income in municipality *i* relative to total declared income in Catalonia and δ_{ij} is the geographic distance between centroids of municipalities *i* and *m*. When interpreting the results, a high result for the clustering measure will indicate that the employment for a certain branch takes place in municipalities having geographically low distance to each other in comparison with the pattern of overall income.

The *income measure* will allow us to assess if the employment is located in wealthier or in poorer municipalities. As we do not have GDP data by municipalities, we again use the same variable defined above as a proxy for the GDP. The measure analyzes if the employment of industry *j* is more localized in those municipalities with high levels of income than total income in those same municipalities. The measure is computed as follows:

$$W^j = \frac{\sum_i \left(y_i^j w_i\right)}{\sum_i \left(y_i w_i\right)}, \qquad (5)$$

where w_i is the average earning declared by the contributors in the income tax (IRPF) for municipality *i*.

Finally, the *centrality measure* adds new information about the sector's pattern of location by analyzing if the employment of industry *j* is more localized in central municipalities than total income. Thus, this new measure expresses if the production is located in the centre or in the periphery of Catalonia, relative to the distribution of total employment in Catalonia. To compute this measure we need to calculate the peripherality index of each municipality for a particular year. Hallet (2000) computes this index following Copus (1999), where the peripherality indicators are calculated as to reflect the economic potential of a location, by summing the influences of all other centres in the system. Copus (1999) uses three different mass variables to compute the index: GDP, labour force and population. We also use labour force and population to compute the peripherality index, but we employ the average earnings declared by the contributors in the income tax (IRPF) for each municipality as a proxy for the GDP. The centrality measure is defined as follows:

$$M^j = \frac{\sum_i \left(\frac{y_i^j}{p_i}\right)}{\sum_i \left(\frac{y_i}{p_i}\right)}, \qquad (4)$$

where $P_i = \sum_{m=1}^{n} \frac{M_m}{\delta_{im}}$ is the peripherality indicator and M_m is the mass variable specified in each case (GDP, labour force or population).

To our knowledge, this is the first time that these three measures proposed by Hallet (2000) are computed in Spain. When interpreting the results for these measures, their common features have to be borne in mind; that is, for example, a result of 1 for a certain measure means that the branch followed the spatial pattern of income in Catalonia.

Specialization measures

We have reviewed how to measure the degree of concentration of a particular sector. Now, we are going to concentrate our attention in how to analyze the degree of specialization of a particular municipality. The first measure presented in the concentration section is easily transformed into a measure that captures the pattern of specialization of the municipalities in Catalonia. Thus, the *relative specialization* of a municipality *i* is given by:

$$L_i = \frac{1}{2}\sum_{j=1}^{R}\left|\frac{Y_{ij}}{Y_i} - \frac{Y_j}{Y}\right|, \qquad (7)$$

where the variables are defined as the relative concentration measure presented above. Again, this index varies between 0 and 1. The more specialized a municipality in few sectors, the more closer this index will be to 1.

The *specialization measure proposed by Hallet (2000)*, as the three measures of concentration presented above (clustering, centrality and income), will be interpreted in terms of disparities with the specialization of Catalonia, being 1 the result for the situation when a municipality has the same pattern of specialization than Catalonia. This specialization measure is computed as follows:

$$V_i = \frac{\frac{1}{\overline{y_j^i}}\sqrt{\frac{\sum_j \left(y_j^i - \overline{y_j^i}\right)^2}{R}}}{\frac{1}{\overline{y_j}}\sqrt{\frac{\sum_j \left(y_j - \overline{y_j}\right)^2}{R}}}, \qquad (9)$$

where, y_j^i will be the employment of sector *j* in municipality *i*, respective to the total employment of this municipality, y_j will be the share of sector *j* in total employment and R will be the number of sectors.

A well-known index of specialization is the one proposed by Krugman (1991a). In this paper, we compute the *specialization index of Krugman calculated à la Hallet (2000)*. The index is computed as the absolute difference between the sectoral share y_i^j of branch *j* in municipality *i* and the respective Catalan average $\overline{y^j}$, summed over all branches *j*:

$$S_i = \frac{1}{2}\sum_j \left| y_i^j - \overline{y^j} \right|, \qquad (8)$$

Coefficients of regional and sectoral concentration

Both the concentration and specialization measures presented until now have a main drawback. On the one hand, concentration measures do not give any information on the geographical distribution patterns of the different sectors. On the other hand, specialization measures are computed only for municipalities, giving an indication of the degree of specialization of each municipality, but they are unable to state in which sectors a particular municipality is specialized. With this purpose on mind, we compute the *coefficients of regional and sectoral concentration* (sometimes called location quotients), defined by:

$$L_{ij} = \frac{Y_{ij}/Y_i}{Y_j/Y} \qquad \mathrm{i = 1, ..., N; j = 1, ..., R}$$

By computing this measure, we can state that if $L_{ij} > 1$, ($L_{ij} < 1$) municipality *i* is more (less) specialized in industry *j* than Catalonia.

The vast majority of these indices and measures have one major shortcoming: they fail to take into account the space in which each municipality is located, considering it as an isolated unit and ignoring any possible links with its neighbouring regions. Therefore, once we have calculated this battery of indices, we use the techniques of the Exploratory Spatial Data Analysis in order to perform a more in-depth study of the geographic distribution of the overall economic activity. Specifically, we compute the Moran's I test both for the specialization measures and the L_{ij}.

Once we have computed these indices for the municipalities of Catalonia, we use the same methodology exposed above to perform the analysis using the LLS of Catalonia instead of the municipalities. We calculate the indices for 1991 and 2001 in order to study the evolution of both the concentration and specialization pattern of overall economic activity in Catalonia. Thus, we are able to perform a comparison between the results of the different indices as well as the outcome obtained using different geographic units and a wide temporal comparison.

3. Data

We use data of employment in each municipality of Catalonia with a 2-digit level of disaggregation corresponding to the CNAE-93 (National Classification of Economic Activities), that is, we have information for 60 sectors including manufactures and services for the 946 municipalities in Catalonia (table 1 displays each sector and its code). The data contains information about the location of activity, say, people working in each municipality for each sector. The data is provided by Idescat (Statistical Institute of Catalonia), and is based on the 1991 and 2001 Census of Population. We have to highlight that the data contains people working in a particular municipality, not people living in a particular municipality. The Hirschman-Herfindhal indices are provided by the Spanish Institute of Statistics (INE), only for the manufacturing sectors (being the value of the index for some of these sectors undisplayed due to the statistical secret). Data about population of each municipality in 1991 and 2001 is provided also by the INE, and we approximate data about GDP per capita of each municipality with data on the average earnings declared by the contributors in the income tax (IRPF, provided by Idescat.

Geographic distance between municipalities and LLS are calculated with a GIS program that, after assigning a centre to each municipality and establish its coordinates, calculates the distance between centroids.

4. Results

In this section we will describe the results after computing each measure presented above for the municipalities and LLS of Catalonia and for each year where data is available; that is, 1991 and 2001. Results will be displayed with the same three subsections developed in the methodology.

Concentration results

The results concerning sectoral information are displayed in four tables[7]. Table 3, 4 and 5 present some descriptive statistics (average, weighted average, minimum, maximum and the coefficient of variation) both for the overall population of sectors and by groups, attending to their technological level (for the manufacturing sectors) or their knowledge intensity (for the service sectors), and for each year under study. The Spearman rank correlation is also displayed in these tables. Table 3 shows the information corresponding to the indices computed having the municipalities as the geographic unit while table 4 shows the results for the LLS. Table 5 displays the results for the EG index using the two different geographic units. In table 6, 7 and 8 one finds the particular values for each index and sector, grouped again by their technological level or their knowledge intensity. For an easiest acknowledgement of which sectors are placed in each group, see table 2.

After a revision of the results displayed in table 3, 4 and 5 one can draw a general picture about the concentration of overall economic activity in Catalonia. The first two measures presented in table 3 and 4 (*relative concentration of the industry j and the Locational Gini Coefficients*, columns one and two, respectively) are computed for all sectors and do not account for industrial concentration, while the *EG index* is calculated only for manufacturing sectors due to restrictions about data availability and uses the Hirschman-Herfindhal index in order to capture the excess of concentration above the industrial concentration. That's why the results shown could seem, in part, contradictory. We have to acknolowedge that, although the general rank for the sectors of the first two indices are very similar (see Spearman rank values), their interpretation differs essentially in the fact that the values obtained for the L_j are always interpreted in respect to the average productive structure[8].

In general, both for municipalities and LLS and over the period under study, the average concentration by groups is higher in manufacturing sectors than in service sectors for the Lj and Locational Gini Indices, and knowledge intensive services appear to be more concentrated in space than non-intensive services. Attending to the manufacturing sectors in particular, one could see that high and low tech industries are the most concentrated attending to the L_j index, while the high and medium high tech industries are the ones that show a highest level of

[7] For the centrality measure, the results presented in these tables use the IRPF as the mass variable to compute the peripherality indicator. No significant differences have appeared when computing the centrality measure using any of the three options mentioned in section 2 as the mass variable for the peripherality index. These results are available from the authors upon request.

[8] We will attend to the weighted average for a comparison of the values of different groups ordered by their technological level instead of looking to the simple average. We weight each sector attending to its participation in total employment of the group because we have great differences in the sizes concerning the number of employees.

concentration if we attend to the Locational Gini Coefficients. A contradiction arises between these two indices when looking at the weighted average for the agriculture, forestry and fishing group. While we obtain that this sector is the most concentrated with the L_j index, the Gini index places this sector under the overall weighted average. For a more exhaustive study of the concentration levels[9] of one particular sector, one could look at tables 6, 7 and 8.

The results for the EG index (tables 5 and 8) in terms of the weighted average are not strictly comparable with those obtained with the other measures of concentration, because the results for the EG index do not include information on the service sectors. However we could see that, after accounting for industrial concentration, some sectors display negative values, indicating not concentration of the activity of this particular sector, but dispersion. By computing this index, we could see that after purging for industrial concentration (see the values for the Hirschman-Herfindhal index), the concentration of high and medium high tech sectors become negative in almost all cases, indicating that there isn't exist excessive concentration above industrial concentration, being these sectors less concentrated than overall employment.

When looking at the results using the two different geographic units, one could see that for the first two measures the level of concentration is lower for LLS than for municipalities, while it is greater for the case of the EG index.

As for the evolution of the concentration during the period considered, the L_j and Gini indices detect a lower level of concentration for the overall employment in 2001 than in 1991. However, this general trend varies with the sectors considered and with the index used. The L_j and Gini indices (the ones that give us information about the service and agriculture sectors), coincide in determining that, over time, the level of concentration of these groups of sectors has diminished both for municipalities and LLS. On the contrary, there exists more differences when describing the evolution of the geographic concentration for the manufacturing sectors. While the L_j shows that the level of concentration of manufacturing sectors is higher in 2001, independently of the technological content and the geographic unit used in the analysis, the Locational Gini Index is less clear when computing the indices at the municipality level. At the LLS level, the conclusions for these two indices are very similar. The evolution of the concentration of the manufacturing sectors after purging for industrial concentration; that is, when analyzing the temporal evolution with the EG index, is again positive, independently of the technological content of the sectors and the geographic level used in the study. Finally, there

[9] We need to take some precautions when looking at the values of sector 37 in 1991, because it only has 1 worker. The same applies to sector 12 in 2001 because it only registers 3 employees.

is total coincidence among the indices when determining that the energy sector has reduced its level of concentration over time.

Now we turn to consider geographic distance between municipalities to compute the *clustering measure*. High results for this index indicate that the employment of a particular sector takes place in regions having geographically low distance to each other comparing to the pattern in the case of total income. Clustering of similar activities seems to be more important in manufacturing (with the exception of low-tech industries) than in service activities both for municipalities and LLS and during the period under consideration. Spillover effects could be behind the higher clustering of high-tech, medium-high tech and medium-low technological industries respective to the clustering of overall income. Compared to the clustering of total income; agriculture, forestry and fishing and energy and others appear to be less clustered geographically. The same result was obtained by Hallet (2000) when studying the clustering measure for 119 European regions. If we take a closer look to the particular values for this measure displayed in table 6 and 7, we could see that practically the total of the manufacturing sectors (with the exception observed above) have values above 1.15 when using the municipalities as the geographic unit of the analysis, but the clustering diminishes in general for manufacturing when using LLS instead of municipalities. However, the rest of groups experiment an increase of the clustering values when we use the LLS. In general, during the period observed, activities have tend to cluster in space as one could see looking at weighted average values of tables 3 and 4.

The *income measure* indicates whether employment is located in wealthier or in poorer municipalities or LLS. As in Hallet (2000), in general, both industry and service sectors follow the income pattern within a rather narrow band of between 0.95 and 1.05. Medium-low and low tech industries seem to be located in poorer municipalities than overall income, while high tech industries and knowledge intensive services appear to be located in the wealthiest regions. It is interesting to point out that, in general, during the period considered, the income measure, both by the overall weighted average and the respective weighted averages by groups has increased its value, that is, the economic activity has tend to locate in wealthier regions, capturing the increasing urbanization effect of overall economic activity. Finally, when comparing the results for the geographic units, one can observe that, in general, the tendency of economic activity to locate in wealthier regions is higher for LLS than for municipalities.

The *centrality measure* indicates whether employment in a particular branch takes place in the centre or in the periphery of Catalonia. As a rather surprising result, the average weight values for the low tech industry, non-knowledge intensive service sector, agriculture and energy are above 1, and that implies that these sectors are more located in central regions than overall activity. These results are valid both for the municipalities and LLS, but is interesting to point out that in using a greater area for the analysis; that is the LLS, the value for the rest of sectors increases while the value for the sectors mentioned above decreases. The general tendency during the period considered is characterized by the decrease of the level of centrality, being the low and medium low industries the only ones that, on average, increase their level of centrality. These results are clearly in contrast with those obtained by Hallet (2000), being the service sector of banking and insurance the most centralised in his case.

Finally, the construction sector displays low values for the first two measures, showing that this sector is far from being concentrated, as well as it is less clustered in space than overall income. Moreover, it seems to follow the pattern of total income when analysing the income measure, and it shows a tendency to be located in central municipalities and LLS. Over time, this sector has reduced its concentration and the other indices have remained pretty stable.

In a future revised version of the article, a more in-depth analysis of the results as well as a deeper comparison to previous literature will be done. Moreover, one could expect that an analysis to assess the significance of the results will shed some light on particular surprising conclusions.

Specialization results

The geographical distribution of the three specialization measures obtained in this paper for the municipalities and for the LLS, for the years 1991 and 2001 respectively, is displayed in Maps 1 to 12. Looking at the maps corresponding to the municipalities of Catalonia for the two years under study, one can acknowledge that in all of them the spatial distribution of specialization is far from being random, with values of the different indices that tend to be clustered in the space. In other words, municipalities with similar specialization patterns tend to be geographically concentrated. In general terms, it seems that the municipalities in the coast tend to be less specialized that the ones in the inner region. This is a common feature for all the indices, although it is more pronounced in the cases of the Hallet measure and the L_i; being the K-especialization index the one that presents a less polarized pattern. When we turn to observe what happens when the unit of the analysis are the LLS, we find a situation similar to that described above for the municipalities, although it seems to be less clear.

The process described above could be related to spatial dependence, that is, to the fact that the specialization pattern in one municipality or LLS may be associated to the one in neighbouring municipalities or LLS, respectively. This possibility can be evaluated by means of the Moran's I statistic (Moran, 1948), a well-known spatial dependence test. The advantage of the spatial dependence tests over the mapping is that the information given by the latter, although true, is somewhat subjective on the range of intervals selected for mapping the index; whereas spatial dependence tests provide a statistical framework. So, we have computed the Moran’s I based on a contiguity weight matrix. The most general specification for the matrix is one of physical contiguity, where unity represents the case of two municipalities or LLS sharing a boundary, and zero in the opposite case. In the case that we use the municipalities to study the specialization of Catalonia, the Moran index for the three indices (as given in each map) shows the existence of a strong positive spatial autocorrelation process that remains stable during the period under consideration, although higher in both years in the case of the Hallet measure and the L_i, confirming the visual impression of spatial clustering given by the maps. In other words, it seems that the specialization patterns are not randomly distributed in space but, on the contrary, there is a trend towards spatial clustering as signaled by the positive spatial dependence pointed by the Moran’s I index. These conclusions are less clear when we calculate the Moran’s I for the three indices using the LLS. Although the Moran’s I for the V_i and L_i indices show that for the whole period it still exists positive spatial dependence in the specialization of LLS, the Moran’s I for the Krugman Specialization index concludes that there is no evidence of spatial dependence. The decline of the value of the Moran’s I statistic for the LLS is capturing that neighbouring LLS have a level of specialization less similar than neighbouring municipalities. One can also observe by looking at tables 9 and 10, that the average value for all the indices diminishes when changing the geographic unit from municipalities to LLS. These results are capturing the fact that when changing the geographic unit from municipality to LLS level, the productive structure of the regions is, in average, more similar to the overall catalan productive structure.

If we want to shed some light on the evolution of the level of specialization of the municipalities and LLS of Catalonia, we can see what happens with the average value for all the indices between the two years under study. Both for the municipalities and for the LLS the level of specialization is lower at the end of the period, implying that the productive structure of municipalities and LLS is becoming more similar to the catalan productive structure.

Finally, the additional information displayed in tables 9 and 10 about the municipalities and LLS more and less specialized and the Spearman Rank coefficients, confirms the previous results about the greater similarity of the V_i and the L_i index versus the S_i index.

Coefficients of regional and sectoral concentration

Tables 11, 12, 13 and 14 displays the average results by sector for the regional and sectoral coefficients of concentration, together with the minimum[10], maximum and the coefficient of variation, as well as the value for the Moran's I and its probability, both at the municipality and LLS level and for the two years under consideration.

From the results, we could get a general impression about both the concentration and specialization of activity in Catalonia. Except for sector 55, *Hostelería*; the two groups of services and high-tech and medium-tech industries display L_{ij} values less than 1; that is, all the sectors grouped in these categories show an average specialization of the municipalities lower than Catalonia for the overall period. However, it is important to highlight that for some of these sectors there is at least one municipality with specialization levels remarkably higher than the overall specialization level in Catalonia (32, *Fabricación de materiales electrónicos; fabricación de equipos y aparatos de radio, televisión y comunicaciones*; and 62, *Transporte aéreo y espacial* in 1991 30, *Fabricación de máquinas de oficina y equipos informáticos;* and 73, *Investigación y desarrollo, in 2001*). When changing the spatial unit of the analysis, except for agriculture and energy sectors and some sectors included in low tech industries, the average specialization of the LLS increases, and the dispersion within each sector, measured by the coefficient of variation decreases.

Low-tech and medium-low technological sectors show average values for their L_{ij} that, in general, are higher than those for the sectors mentioned above both for municipalities and LLS. Nonetheless, one could find several values above and below 1, and any of them is remarkably high or low. Thus, in general, for these two sectors we could state that the average specialization of the municipalities corresponds with that of total employment (with the exception of sector 16, *Industria del tabaco*, which displays a very low value in almost all cases). In this case, we could find again some sectors in which at least one municipality shows high levels of specialization, compared to the specialization level in Catalonia (23, *Coquerías, refino de petróleo y tratamiento de combustibles nucleares*).

The higher average values as well as the higher maximums are found in sectors 01, *Agricultura, ganadería, caza y actividades de servicios relacionados con las mismas*; 02, *Silvicultura, explotación forestal y actividades de los servicios relacionados con las mismas*; and 11, *Extracción de crudos de petróleo y gas natural; actividades de los servicios relacionados con las explotaciones petrolíferas y de gas, excepto actividades de prospección*; indicating that certain municipalities or LLS have a level of specialization in these sectors extraordinarily higher with respect to Catalonia.

[10] The fact that the minimum value for each sector is always zero, means that there is at least one municipality in each sector which has no employment for that particular sector.

The evolution of average concentration for a particular sector is somewhat different depending on the geographic unit used in the study. While for LLS almost half of the sectors have reduced their average level of concentration, when looking at the municipality level, one can see that for the majority of sectors the average values have increased.

Attending now to the results of Moran's I statistic and its probability, three main conclusions could be drawn. First, only in one fourth of the sectors for the overall period the distribution of the L_{ij} index is random, while a highly significant positive spatial association is detected in the rest of sectors when the analysis is done at the municipality level. So, generally speaking, it seems that nearby municipalities tend to show similar patterns of sectoral concentration and that the space still matters. However, when using the LLS as the geograhic unit of the analysis, almost the 50% of sectors show levels of spatial association that are not significant statistically speaking. Thus, using LLS instead of municipalities reduces the evidence of spatial dependence. This is a logical result in the sense that at a higher level of geographic disaggregation one expects greater similarities between smaller units. Thus, these results are capturing the sensibility of spatial dependence tests to changes in the geographical scale.

Second, the agriculture and industrial sectors show, in average terms, higher values of the Moran's I than the services and energy sectors (agriculture show the maximum values of this spatial autocorrelation test) both at the municipality and LLS level. In general, agriculture and almost all the industrial sectors show a positive and significant spatial dependence while most of knowledge intensive sectors are randomly distributed through the space, jointly with some energy sectors. So, it could be concluded that the advantages of being closer to municipalities with a similar specialisation pattern are bigger in the case of industrial sectors than services (maybe explained by the major relevance of agglomeration economies on the first type of sectors). The same applies to LLS.

Finally, it seems that technological level of the industrial sectors does not influence to the value of Moran's I. So, we detect highly significant positive spatial dependence patterns in high tech industries, industries with medium – high tech level and more traditional sectors.

5. Conclusions

The main purpose of this article consists in analyzing the sectoral concentration of economic activity in Catalonia both for at the municipality and LLS level, as well as the degree of specialization of the municipalities in the same territory. In doing so several novelties are introduced if compared to previous research. First, in addition to the most common indices, some new indices in the international literature are used for the first time in the Spanish case. Second, a high level of sectoral and geographical disaggregation is considered, with information covering not only the manufacturing sector, as common in the literature, but also the service sector. Third, we analyze the geographical distribution of specialization in Catalonia, in other words, we check whether closer municipalities tend to show similar specialization patterns.

The level of concentration of manufacturing and service sectors have been analyzed by computing several indices of concentration proposed in the literature. To our knowledge, the analysis of the concentration of the service sectors as well as the computation of some of the indices (as those proposed by Hallet, 2000) is a novelty in Catalonia and also in Spain. Moreover, the high level of disaggregation both at the regional and sectoral level constitutes an advantage in front of other related literature at the Spanish level, as well as the fact of considering LLS in the analysis. Finally, the computation of specialization measures and the techniques of the Exploratory Spatial Data Analysis have allowed us to study the degree of specialization of the municipalities in Catalonia and its spatial distribution.

As the EG index purges from industrial concentration, it exists a greater similarity between the results of the L_j and Locational Gini indices. In general, both for municipalities and LLS and over the period under study, the average concentration by groups is higher in manufacturing sectors than in service sectors for the L_j and Locational Gini Indices, and knowledge intensive services appear to be more concentrated in space than non-intensive services. Attending to the manufacturing sectors in particular, these two indices show some dissimilarities, but it seems that high tech sectors are very concentrated among the industry group. However, once we have purged from industrial concentration; that is, we have computed the EG index, the level of geographic concentration of high and medium high tech industries becomes negative (there is no existence of spatial concentration beyond industrial concentration). On the contrary, the positive values for the low and medium low levels could be revealing the existence of agglomerative forces in these particular industries. During the period considered, the level of concentration of overall employment has diminished due to the weight of service activities in overall employment; but if one pays attention to the manufacturing sectors, one can observe that, in general, the level of concentration of manufacturing sectors has increased over time, even after purging from industrial concentration. When looking at the results using the two different geographic units, one could see that for the first two measures the level of concentration is lower for LLS than for municipalities, while it is greater for the case of the EG index.

Clustering of similar activities seems to be more important in manufacturing (with the exception of low-tech industries) than in service activities both for municipalities and LLS and during the period under consideration. In general, during the period observed, activities have tend to cluster in space. As for the income measure, medium-low and low tech industries seem to be located in poorer municipalities than overall income, while high tech industries and knowledge intensive services appear to be located in the wealthiest regions. The surprising results for the centrality measure of Hallet (2000) will be the object of a more in-depth analysis in a future research.

The spatial distribution of specialization is far from being random, with values of the different indices that tend to be clustered in the space. In general terms, it seems that the municipalities in the coast tend to be less specialized that the ones in the inner region. In the case that we use the municipalities to study the specialization of Catalonia, the Moran index for the three indices shows the existence of a strong positive spatial autocorrelation process that remains stable during the period under consideration. These conclusions are less clear when we calculate the Moran's I for the three indices using the LLS. Although the Moran's I for the V_i and L_i indices show that for the whole period it still exists positive spatial dependence in the specialization of LLS, the Moran's I for the Krugman Specialization index concludes that there is no evidence of spatial dependence. Moreover, the average value for all the indices diminishes when changing the geographic unit from municipalities to LLS. These results are capturing the fact that when changing the geographic unit from municipality to LLS level, the productive structure of the regions is, in average, more similar to the overall catalan productive structure. Finally, both for the municipalities and for the LLS the level of specialization is lower at the end of the period, implying that the productive structure of municipalities and LLS is becoming more similar to the catalan productive structure.

In a future research, and given that we do not have the information needed to compute distance-based indices the way they are initially proposed, we will try to compute these indices using data about the employees of the municipalities of Catalonia, in order to overcome some specific limitations of the indices used in this paper. Moreover, we will perform a more in-depth analysis of the results as well as a deeper comparison to previous literature. Finally, we will improve the Exploratory Spatial Data analysis with the computation of local statistics of spatial dependence.

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Tables and figures

Table 1. Codes and sectors at the two digit level of the CNAE-93

CODE	SECTORS (2-DIGIT LEVEL CORRESPONDING TO THE CNAE-93)
01	Agricultura, ganadería, caza y actividades de servicios relacionados con las mismas
02	Silvicultura, explotación forestal y actividades de los servicios relacionados con las mismas
05	Pesca, acuicultura y actividades de los servicios relacionados con las mismas
10	Extracción y aglomeración de antracita, hulla, lignito y turba
11	Extracción de crudos de petróleo y gas natural; actividades de los servicios relacionados con las explotaciones petrolíferas y de gas, excepto actividades de prospección
12	Extracción de minerales de uranio y de torio
13	Extracción de minerales metálicos
14	Extracción de minerales no métalicos ni energéticos
15	Industria de productos alimenticios y bebidas
16	Industria del tabaco
17	Industria textil
18	Industria de la confección y de la peletería
19	Preparación, curtido y acabado del cuero; fabricación de artículos de marroquinería y viaje; artículos de guarnicionería, talabartería y zapatería
20	Industria de la madera y del corcho, excepto muebles; cestería y espartería
21	Industria del papel
22	Edición, artes gráficas y reproducción de soportes grabados
23	Coquerías, refino de petróleo y tratamiento de combustibles nucleares
24	Industria química
25	Fabricación de productos de caucho y materias plásticas
26	Fabricación de otros productos minerales no metálicos
27	Metalurgia
28	Fabricación de productos metálicos, excepto maquinaria y equipo
29	Industria de la construcción de maquinaria y equipo mecánico
30	Fabricación de máquinas de oficina y equipos informáticos
31	Fabricación de maquinaria y material eléctrico
32	Fabricación de material electrónico; fabricación de equipo y aparatos de radio, televisión y comunicaciones
33	Fabricación de equipo e instrumentos médico-quirúrgicos, de precisión óptica y relojería
34	Fabricación de vehículos de motor, remolques y semirremolques
35	Fabricación de otro material de transporte
36	Fabricación de muebles; otras industrias manufactureras
37	Reciclaje
40	Producción y distribución de energía eléctrica, gas, vapor y agua caliente

Table 1 (continuation)

CODE	SECTORS (2-DIGIT LEVEL CORRESPONDING TO THE CNAE-93)
41	Captación, depuración y distribución de agua
45	Construcción
50	Venta, mantenimiento y reparación de vehículos de motor, motocicletas y ciclomotores; venta al por menor de combustible para los vehículos de motor
51	Comercio al por mayor e intermediarios del comercio, excepto de vehículos de motor y motocicletas
52	Comercio al por menor, excepto el comercio de vehículos de motor y motocicletas y ciclomotores; reparación de efectos personales y enseres domésticos
55	Hostelería
60	Transporte terrestre; transporte por tuberías
61	Transporte marítimo, de cabotaje y por vías de navegación interiores
62	Transporte aéreo y espacial
63	Actividades anexas a los transportes; actividades de agencias de viajes
64	Correos y telecomunicaciones
65	Intermediación financiera, excepto seguros y planes de pensiones
66	Seguros y planes de pensiones, excepto seguridad social obligatoria
67	Actividades auxiliares a la intermediación financiera
70	Actividades inmobiliarias
71	Alquiler de maquinaria y equipo sin operario, de efectos personales y enseres domésticos
72	Actividades informáticas
73	Investigación y desarrollo
74	Otras actividades empresariales
75	Administración Pública, defensa y seguridad social obligatoria
80	Educación
85	Actividades sanitarias y veterinarias; servicios sociales
90	Actividades de saneamiento público
91	Actividades asociativas
92	Actividades recreativas, culturales y deportivas
93	Actividades diversas de servicios personales
95	Hogares que emplean personal doméstico
99	Organismos extraterritoriales

Table 2. Sectors classified according to their technological level or knowledge intensity

HIGH TECHNOLOGICAL LEVEL	
30	Fabricación de máquinas de oficina y equipos informáticos
32	Fabricación de material electrónico; fabricación de equipo y aparatos de radio, televisión y comunicaciones
MEDIUM - HIGH TECHNOLOGICAL LEVEL	
24	Industria química
29	Industria de la construcción de maquinaria y equipo mecánico
31	Fabricación de maquinaria y material eléctrico
33	Fabricación de equipo e instrumentos médico-quirúrgicos, de precisión óptica y relojería
34	Fabricación de vehículos de motor, remolques y semirremolques
35	Fabricación de otro material de transporte
LOW - MEDIUM TECHNOLOGICAL LEVEL	
23	Coquerías, refino de petróleo y tratamiento de combustibles nucleares
25	Fabricación de productos de caucho y materias plásticas
26	Fabricación de otros productos minerales no metálicos
27	Metalurgia
28	Fabricación de productos metálicos, excepto maquinaria y equipo
36	Fabricación de muebles; otras industrias manufactureras
LOW TECHNOLOGICAL LEVEL	
15	Industria de productos alimenticios y bebidas
16	Industria del tabaco
17	Industria textil
18	Industria de la confección y de la peletería
19	Preparación, curtido y acabado del cuero; fabricación de artículos de marroquinería y viaje; artículos de guarnicionería, talabartería y zapatería
20	Industria de la madera y del corcho, excepto muebles; cestería y espartería
21	Industria del papel
22	Edición, artes gráficas y reproducción de soportes grabados

Table 2 (continuation)

KNOWLEDGE - INTENSIVE SERVICES	
61	Transporte marítimo, de cabotaje y por vías de navegación interiores
62	Transporte aéreo y espacial
64	Correos y telecomunicaciones
65	Intermediación financiera, excepto seguros y planes de pensiones
66	Seguros y planes de pensiones, excepto seguridad social obligatoria
67	Actividades auxiliares a la intermediación financiera
70	Actividades inmobiliarias
71	Alquiler de maquinaria y equipo sin operario, de efectos personales y enseres domésticos
72	Actividades informáticas
73	Investigación y desarrollo
74	Otras actividades empresariales
80	Educación
85	Actividades sanitarias y veterinarias; servicios sociales
92	Actividades recreativas, culturales y deportivas
NON KNOWLEDGE - INTENSIVE SERVICES	
50	Venta, mantenimiento y reparación de vehículos de motor, motocicletas y ciclomotores; venta al por menor de combustible para los vehículos de motor
51	Comercio al por mayor e intermediarios del comercio, excepto de vehículos de motor y motocicletas
52	Comercio al por menor, excepto el comercio de vehículos de motor y motocicletas y ciclomotores; reparación de efectos personales y enseres domésticos
55	Hostelería
60	Transporte terrestre; transporte por tuberías
63	Actividades anexas a los transportes; actividades de agencias de viajes
75	Administración Pública, defensa y seguridad social obligatoria
90	Actividades de saneamiento público
91	Actividades asociativas
93	Actividades diversas de servicios personales
95	Hogares que emplean personal doméstico
99	Organismos extraterritoriales

Table 2 (Continuation)

AGRICULTURE, FORESTRY AND FISHING	
01	Agricultura, ganadería, caza y actividades de servicios relacionados con las mismas
02	Silvicultura, explotación forestal y actividades de los servicios relacionados con las mismas
05	Pesca, acuicultura y actividades de los servicios relacionados con las mismas
ENERGY AND OTHERS	
10	Extracción y aglomeración de antracita, hulla, lignito y turba
11	Extracción de crudos de petróleo y gas natural; actividades de los servicios relacionados con las explotaciones petrolíferas y de gas, excepto actividades de prospección
12	Extracción de minerales de uranio y de torio
13	Extracción de minerales metálicos
14	Extracción de minerales no métalicos ni energéticos
37	Reciclaje
40	Producción y distribución de energía eléctrica, gas, vapor y agua caliente
41	Captación, depuración y distribución de agua
CONSTRUCTION	
45	Construcción

Table 3. Descriptive statistics for the concentration measures. Municipalities

	Lj 1991	Lj 2001	Gini 1991	Gini 2001	Cj 1991	Cj 2001	Wj 1991	Wj 2001	Mj 1991	Mj 2001
OVERALL POPULATION										
Average	0.336	0.366	0.386	0.379	0.845	0.923	1.001	0.981	1.097	1.071
Weighted average	0.234	0.224	0.297	0.272	0.887	0.915	0.993	0.985	1.074	1.051
Min	0.081	0.092	0.184	0.153	0.000	0.276	0.755	0.809	0.660	0.575
Max	0.981	0.981	0.500	0.500	1.368	1.841	1.120	1.116	2.175	2.065
Coeff variation	0.515	0.550	0.228	0.251	0.326	0.295	0.066	0.066	0.282	0.262
HIGH TECHNOLOGICAL LEVEL										
Average	0.321	0.376	0.459	0.466	1.275	1.278	1.054	1.026	0.767	0.864
Weighted average	0.317	0.367	0.458	0.455	1.272	1.433	1.050	1.002	0.770	0.719
Min	0.294	0.365	0.457	0.453	1.247	1.098	1.024	0.998	0.740	0.696
Max	0.347	0.386	0.460	0.480	1.303	1.458	1.083	1.054	0.793	1.032
Coeff variation	0.117	0.040	0.006	0.041	0.031	0.199	0.039	0.039	0.049	0.275
MEDIUM - HIGH TECHNOLOGICAL LEVEL										
Average	0.286	0.363	0.398	0.413	1.188	1.213	1.011	0.976	0.869	0.880
Weighted average	0.266	0.365	0.376	0.389	1.174	1.253	1.011	0.979	0.849	0.824
Min	0.189	0.275	0.347	0.356	1.037	1.029	0.985	0.951	0.758	0.788
Max	0.407	0.453	0.460	0.465	1.368	1.351	1.064	1.007	0.978	1.039
Coeff variation	0.282	0.193	0.125	0.106	0.106	0.106	0.030	0.022	0.098	0.124
MEDIUM - LOW TECHNOLOGICAL LEVEL										
Average	0.362	0.433	0.385	0.391	1.032	1.154	0.953	0.926	1.027	1.107
Weighted average	0.297	0.336	0.342	0.334	1.077	1.034	0.957	0.932	0.970	1.002
Min	0.199	0.268	0.296	0.295	0.681	0.825	0.935	0.904	0.823	0.866
Max	0.522	0.776	0.476	0.491	1.305	1.841	0.964	0.937	1.443	1.581
Coeff variation	0.318	0.416	0.180	0.170	0.218	0.314	0.012	0.015	0.225	0.236
LOW TECHNOLOGICAL LEVEL										
Average	0.378	0.453	0.401	0.402	0.823	0.789	0.969	0.935	1.148	1.182
Weighted average	0.347	0.381	0.364	0.362	0.902	0.903	0.960	0.939	1.056	1.074
Min	0.257	0.239	0.290	0.296	0.413	0.408	0.912	0.881	0.748	0.764
Max	0.601	0.616	0.484	0.488	1.359	1.314	1.048	1.020	1.599	1.588
Coeff variation	0.331	0.296	0.160	0.157	0.328	0.345	0.046	0.052	0.231	0.227
KNOWLEDGE INTENSIVE SERVICES										
Average	0.278	0.279	0.381	0.360	0.823	0.945	1.057	1.042	0.950	0.901
Weighted average	0.212	0.200	0.305	0.270	0.858	0.933	1.047	1.033	0.982	0.959
Min	0.103	0.111	0.216	0.191	0.568	0.700	1.005	0.967	0.660	0.575
Max	0.505	0.570	0.487	0.485	1.245	1.331	1.099	1.093	1.047	1.039
Coeff variation	0.367	0.441	0.208	0.261	0.235	0.165	0.027	0.034	0.113	0.129
NON KNOWLEDGE INTENSIVE SERVICES										
Average	0.233	0.192	0.327	0.302	0.802	0.882	1.029	1.007	1.035	1.020
Weighted average	0.138	0.136	0.246	0.232	0.844	0.882	1.011	0.993	1.079	1.070
Min	0.081	0.092	0.185	0.181	0.447	0.698	0.973	0.954	0.864	0.801
Max	0.501	0.527	0.494	0.493	1.071	1.098	1.120	1.097	1.194	1.158
Coeff variation	0.641	0.626	0.311	0.318	0.210	0.151	0.043	0.039	0.093	0.113
AGRICULTURE, FORESTRY AND FISHING										
Average	0.662	0.617	0.395	0.399	0.436	0.466	0.835	0.863	1.983	1.853
Weighted average	0.652	0.601	0.262	0.290	0.408	0.428	0.765	0.817	2.158	2.028
Min	0.643	0.566	0.242	0.270	0.384	0.391	0.755	0.809	1.742	1.449
Max	0.695	0.691	0.485	0.477	0.518	0.581	0.876	0.893	2.175	2.065
Coeff variation	0.043	0.106	0.338	0.282	0.164	0.217	0.083	0.054	0.111	0.189
ENERGY AND OTHERS										
Average	0.494	0.577	0.471	0.472	0.606	0.794	0.970	0.964	1.388	1.189
Weighted average	0.300	0.261	0.435	0.429	0.666	0.809	0.997	0.991	1.327	1.184
Min	0.229	0.179	0.423	0.409	0.000	0.276	0.894	0.874	1.009	0.864
Max	0.981	0.981	0.500	0.500	0.888	1.141	1.020	1.116	1.914	1.538
Coeff variation	0.525	0.494	0.060	0.074	0.485	0.324	0.053	0.082	0.211	0.173

Spearman rank			
Lj 1991 - Gini 1991	0.780	Lj 1991 - Lj 2001	0.858
Lj 2001 - Gini 2001	0.784	Gini 1991 - Gini 2001	0.916

Table 4. Descriptive statistics for the concentration measures. LLS

	Lj 1991	Lj 2001	Gini 1991	Gini 2001	Cj 1991	Cj 2001	Wj 1991	Wj 2001	Mj 1991	Mj 2001
OVERALL POPULATION										
Average	0.270	0.289	0.248	0.251	0.841	0.882	1.004	0.991	1.086	1.059
Weighted average	0.182	0.174	0.175	0.154	0.903	0.929	0.999	0.996	1.050	1.034
Min	0.034	0.043	0.066	0.057	0.000	0.264	0.828	0.857	0.820	0.733
Max	0.969	0.788	0.500	0.490	1.280	1.518	1.124	1.110	2.191	1.962
Coeff variation	0.615	0.610	0.419	0.463	0.288	0.263	0.058	0.055	0.235	0.219
HIGH TECHNOLOGICAL LEVEL										
Average	0.254	0.286	0.313	0.353	1.164	1.327	1.057	1.016	0.848	0.882
Weighted average	0.249	0.299	0.315	0.362	1.179	1.491	1.053	1.013	0.847	0.754
Min	0.213	0.270	0.294	0.343	1.047	1.135	1.029	1.013	0.835	0.733
Max	0.295	0.301	0.332	0.364	1.280	1.518	1.085	1.019	0.862	1.030
Coeff variation	0.227	0.077	0.086	0.042	0.142	0.204	0.037	0.004	0.022	0.238
MEDIUM - HIGH TECHNOLOGICAL LEVEL										
Average	0.219	0.277	0.286	0.317	1.103	1.149	1.017	0.993	0.917	0.904
Weighted average	0.205	0.287	0.278	0.314	1.130	1.190	1.016	0.995	0.900	0.862
Min	0.132	0.177	0.185	0.293	0.937	1.053	0.988	0.970	0.852	0.820
Max	0.320	0.350	0.366	0.342	1.236	1.296	1.073	1.023	1.001	1.022
Coeff variation	0.316	0.231	0.211	0.062	0.101	0.076	0.032	0.021	0.061	0.087
MEDIUM - LOW TECHNOLOGICAL LEVEL										
Average	0.302	0.352	0.262	0.274	1.002	0.899	0.962	0.956	1.019	1.137
Weighted average	0.243	0.262	0.220	0.217	1.071	1.036	0.965	0.956	0.954	0.973
Min	0.154	0.201	0.174	0.187	0.521	0.264	0.945	0.942	0.838	0.867
Max	0.454	0.741	0.318	0.390	1.226	1.138	0.973	0.962	1.480	1.962
Coeff variation	0.355	0.558	0.259	0.258	0.258	0.361	0.010	0.008	0.235	0.362
LOW TECHNOLOGICAL LEVEL										
Average	0.310	0.376	0.292	0.302	0.848	0.831	0.970	0.950	1.114	1.134
Weighted average	0.280	0.318	0.263	0.268	0.950	0.950	0.969	0.957	1.004	1.014
Min	0.183	0.197	0.188	0.218	0.366	0.369	0.928	0.905	0.851	0.841
Max	0.563	0.536	0.390	0.418	1.131	1.178	1.052	1.033	1.717	1.653
Coeff variation	0.430	0.327	0.246	0.257	0.272	0.306	0.038	0.044	0.246	0.242
KNOWLEDGE INTENSIVE SERVICES										
Average	0.227	0.230	0.193	0.188	0.808	0.892	1.055	1.046	0.995	0.956
Weighted average	0.164	0.155	0.139	0.116	0.852	0.921	1.043	1.035	1.009	0.985
Min	0.047	0.068	0.072	0.057	0.590	0.628	1.001	0.993	0.820	0.761
Max	0.405	0.502	0.340	0.341	1.042	1.023	1.100	1.101	1.053	1.029
Coeff variation	0.446	0.519	0.417	0.480	0.185	0.120	0.028	0.030	0.067	0.073
NON KNOWLEDGE INTENSIVE SERVICES										
Average	0.176	0.142	0.182	0.147	0.816	0.884	1.028	1.016	1.040	1.027
Weighted average	0.097	0.093	0.112	0.109	0.857	0.900	1.012	1.002	1.066	1.056
Min	0.034	0.043	0.066	0.061	0.460	0.625	0.967	0.965	0.930	0.896
Max	0.438	0.435	0.408	0.426	1.110	1.026	1.124	1.110	1.144	1.126
Coeff variation	0.717	0.768	0.677	0.659	0.209	0.140	0.045	0.037	0.061	0.073
AGRICULTURE, FORESTRY AND FISHING										
Average	0.574	0.513	0.330	0.311	0.523	0.549	0.877	0.892	1.649	1.587
Weighted average	0.556	0.520	0.251	0.252	0.507	0.516	0.834	0.862	1.760	1.702
Min	0.546	0.403	0.237	0.239	0.470	0.454	0.828	0.857	1.455	1.266
Max	0.626	0.619	0.419	0.396	0.591	0.679	0.908	0.919	1.768	1.782
Coeff variation	0.078	0.210	0.277	0.254	0.118	0.212	0.049	0.036	0.103	0.177
ENERGY AND OTHERS										
Average	0.382	0.425	0.344	0.375	0.628	0.721	0.966	0.953	1.335	1.106
Weighted average	0.217	0.178	0.298	0.284	0.719	0.823	0.988	0.995	1.210	1.119
Min	0.116	0.067	0.226	0.168	0.000	0.471	0.899	0.888	1.024	0.898
Max	0.969	0.788	0.500	0.490	0.914	1.120	1.017	1.008	2.191	1.338
Coeff variation	0.766	0.597	0.252	0.301	0.488	0.310	0.045	0.051	0.299	0.125

Spearman rank			
Lj 1991 - Gini 1991	0.804	Lj 1991 - Lj 2001	0.789
Lj 2001 - Gini 2001	0.831	Gini 1991 - Gini 2001	0.865

Table 5. Descriptives statistics for the EG index.

	MUNICIPALITIES		LOCAL LABOUR SYSTEMS	
	EG 1991	EG 2001	EG 1991	EG 2001
OVERALL POPULATION				
Average	-0.039	-0.056	-0.018	0.014
Weighted average	-0.002	0.010	0.007	0.056
Min	-0.969	-0.849	-0.815	-0.800
Max	1.242	0.100	1.272	0.257
Coeff of variation	-8.582	-3.674	-17.651	13.575
HIGH TECHNOLOGICAL LEVEL				
Average	-0.234	-0.457	-0.229	-0.407
Weighted average	-0.211	-0.120	-0.205	-0.069
Min	-0.418	-0.849	-0.411	-0.800
Max	-0.051	-0.065	-0.046	-0.013
Coeff of variation	-1.109	-1.213	-1.131	-1.368
MEDIUM - HIGH TECHNOLOGICAL LEVEL				
Average	-0.037	-0.009	-0.029	0.036
Weighted average	-0.027	-0.013	-0.021	0.037
Min	-0.139	-0.064	-0.134	0.011
Max	0.006	0.016	0.014	0.060
Coeff of variation	-1.540	-3.265	-1.897	0.573
MEDIUM - LOW TECHNOLOGICAL LEVEL				
Average	-0.142	0.031	-0.106	0.076
Weighted average	0.003	0.033	0.016	0.075
Min	-0.969	0.015	-0.815	0.051
Max	0.036	0.044	0.056	0.091
Coeff of variation	-2.845	0.332	-3.294	0.210
LOW TECHNOLOGICAL LEVEL				
Average	0.027	0.043	0.037	0.086
Weighted average	0.032	0.036	0.042	0.080
Min	0.006	0.009	0.008	0.049
Max	0.076	0.090	0.097	0.157
Coeff of variation	0.939	0.637	0.861	0.418
ENERGY AND OTHERS				
Average	0.049	-0.156	0.085	-0.002
Weighted average	-0.168	-0.250	-0.149	-0.191
Min	-0.383	-0.468	-0.297	-0.253
Max	1.242	0.100	1.272	0.257
Coeff of variation	12.317	-1.381	7.081	-110.267

SPEARMAN RANK

MUNICIPALITIES		LOCAL LABOUR SYSTEMS	
EG 1991 - Lj 1991	0.286	EG 1991 - Lj 1991	0.407
EG 1991 - Gini 1991	-0.341	EG 1991 - Gini 1991	-0.029
EG 2001 - Lj 2001	0.358	EG 2001 - Lj 2001	0.629
EG 2001 - Gini 2001	-0.309	EG 2001 - Gini 2001	-0.068
EG 1991 - EG 2001	0.781	EG 1991 - EG 2001	0.625

Table 6. Values for the concentration measures. Municipalities

CODE	Lj 1991	Lj 2001	Gini 1991	Gini 2001	Cj 1991	Cj 2001	Wj 1991	Wj 2001	Mj 1991	Mj 2001
HIGH TECHNOLOGICAL LEVEL										
30	0.347	0.386	0.460	0.480	1.303	1.098	1.083	1.054	0.740	1.032
32	0.294	0.365	0.457	0.453	1.247	1.458	1.024	0.998	0.793	0.696
MEDIUM - HIGH TECHNOLOGICAL LEVEL										
24	0.250	0.337	0.366	0.382	1.173	1.275	1.016	0.994	0.850	0.813
29	0.250	0.313	0.349	0.356	1.267	1.351	0.985	0.974	0.851	0.788
31	0.189	0.365	0.347	0.405	1.061	1.029	0.992	0.951	0.962	0.997
33	0.260	0.275	0.428	0.464	1.368	1.309	1.019	1.007	0.816	0.847
34	0.358	0.436	0.439	0.408	1.037	1.230	1.064	0.974	0.758	0.796
35	0.407	0.453	0.460	0.465	1.222	1.085	0.988	0.956	0.978	1.039
MEDIUM - LOW TECHNOLOGICAL LEVEL										
23	0.522	0.776	0.476	0.491	0.681	1.841	0.942	0.904	1.443	1.581
25	0.429	0.426	0.410	0.393	1.305	1.136	0.962	0.936	0.823	0.928
26	0.364	0.397	0.395	0.399	0.941	0.825	0.935	0.914	1.053	1.162
27	0.392	0.422	0.424	0.423	1.194	1.165	0.954	0.936	0.838	0.866
28	0.268	0.308	0.311	0.295	1.138	1.054	0.960	0.932	0.916	0.958
36	0.199	0.268	0.296	0.347	0.933	0.902	0.964	0.937	1.092	1.145
LOW TECHNOLOGICAL LEVEL										
15	0.257	0.346	0.290	0.296	0.781	0.668	0.957	0.922	1.203	1.318
16	0.601	0.616	0.484	0.488	0.413	0.408	1.010	0.998	1.599	1.461
17	0.518	0.599	0.397	0.422	0.840	0.884	0.922	0.895	1.013	1.004
18	0.263	0.360	0.358	0.355	0.863	0.874	0.955	0.923	1.066	1.026
19	0.362	0.563	0.456	0.457	0.832	0.841	0.986	0.921	1.049	1.072
20	0.377	0.433	0.365	0.374	0.610	0.536	0.912	0.881	1.439	1.588
21	0.376	0.469	0.458	0.448	0.889	0.792	0.964	0.916	1.067	1.220
22	0.269	0.239	0.399	0.375	1.359	1.314	1.048	1.020	0.748	0.764
KNOWLEDGE - INTENSIVE SERVICES										
61	0.371	0.454	0.470	0.461	0.568	0.763	1.081	1.087	0.994	0.850
62	0.505	0.570	0.487	0.478	1.245	1.331	1.026	0.967	0.660	0.575
64	0.242	0.279	0.331	0.296	0.774	1.032	1.056	1.059	1.029	0.859
65	0.205	0.175	0.293	0.271	0.721	0.884	1.045	1.023	1.027	0.972
66	0.326	0.302	0.402	0.371	0.600	0.816	1.092	1.070	0.943	0.902
67	0.338	0.301	0.464	0.428	0.619	0.700	1.083	1.062	0.956	0.945
70	0.348	0.200	0.428	0.380	0.601	0.854	1.075	1.027	1.009	1.001
71	0.157	0.187	0.415	0.442	0.904	1.068	1.014	1.011	1.047	0.925
72	0.349	0.335	0.422	0.371	0.813	1.082	1.099	1.093	0.795	0.789
73	0.243	0.370	0.417	0.485	1.053	0.957	1.055	1.066	0.901	0.871
74	0.221	0.189	0.294	0.243	0.863	0.926	1.065	1.044	0.931	0.927
80	0.103	0.111	0.216	0.191	0.944	0.902	1.005	1.007	1.042	1.039
85	0.233	0.198	0.317	0.266	0.925	0.923	1.041	1.015	0.993	1.011
92	0.250	0.240	0.385	0.358	0.890	0.996	1.066	1.052	0.980	0.945
NON KNOWLEDGE - INTENSIVE SERVICES										
50	0.131	0.152	0.288	0.259	0.815	0.825	0.973	0.954	1.167	1.158
51	0.165	0.101	0.318	0.253	0.957	1.027	1.034	0.994	0.968	0.981
52	0.081	0.092	0.185	0.181	0.878	0.903	0.998	0.983	1.080	1.072
55	0.162	0.157	0.270	0.230	0.728	0.757	0.994	0.992	1.194	1.157
60	0.132	0.128	0.245	0.284	0.990	1.005	1.016	0.987	0.980	0.979
63	0.367	0.207	0.424	0.352	0.670	1.098	1.076	1.013	1.013	0.865
75	0.176	0.162	0.232	0.206	0.764	0.785	1.031	1.005	1.121	1.141
90	0.501	0.161	0.494	0.404	1.071	1.011	0.981	0.983	0.964	0.990
91	0.305	0.290	0.383	0.425	0.651	0.698	1.076	1.037	0.973	1.078
93	0.085	0.100	0.258	0.251	0.840	0.865	0.998	0.981	1.084	1.089
95	0.193	0.226	0.328	0.283	0.808	0.900	1.047	1.060	1.013	0.930
99	0.497	0.527	0.494	0.493	0.447	0.706	1.120	1.097	0.864	0.801
AGRICULTURE, FORESTRY AND FISHING										
01	0.648	0.596	0.242	0.270	0.408	0.426	0.755	0.809	2.175	2.046
02	0.643	0.566	0.458	0.449	0.518	0.581	0.875	0.886	1.742	1.449
05	0.695	0.691	0.485	0.477	0.384	0.391	0.876	0.893	2.033	2.065

Table 6 (continuation)

ENERGY AND OTHERS										
10	0.570	0.801	0.487	0.497	0.601	0.988	0.909	0.885	1.458	1.390
11	0.455	0.614	0.496	0.500	0.628	0.876	0.966	0.977	1.406	1.145
12	*	0.981	*	0.500	*	0.276	*	1.116	*	1.143
13	0.378	0.749	0.483	0.495	0.888	0.734	0.973	0.904	1.100	1.176
14	0.605	0.672	0.459	0.470	0.625	0.672	0.894	0.874	1.457	1.538
37	0.981	0.394	0.500	0.475	0.000	1.141	1.020	0.960	1.914	0.864
40	0.243	0.226	0.423	0.428	0.627	0.763	1.019	1.011	1.371	1.220
41	0.229	0.179	0.450	0.409	0.873	0.898	1.006	0.985	1.009	1.038
CONSTRUCTION										
45	0.144	0.144	0.184	0.153	0.728	0.737	0.965	0.956	1.227	1.217

* There are no workers in sector 12 in 1991

Table 7. Values for the concentration measures. LLS

CODE	Lj 1991	Lj 2001	Gini 1991	Gini 2001	Cj 1991	Cj 2001	Wj 1991	Wj 2001	Mj 1991	Mj 2001
HIGH TECHNOLOGICAL LEVEL										
30	0.295	0.270	0.294	0.343	1.047	1.135	1.085	1.019	0.862	1.030
32	0.213	0.301	0.332	0.364	1.280	1.518	1.029	1.013	0.835	0.733
MEDIUM - HIGH TECHNOLOGICAL LEVEL										
24	0.181	0.254	0.271	0.307	1.124	1.192	1.018	1.013	0.924	0.891
29	0.209	0.275	0.289	0.293	1.209	1.296	0.988	0.985	0.877	0.821
31	0.132	0.262	0.185	0.329	1.072	1.080	0.997	0.970	0.962	0.957
33	0.190	0.177	0.282	0.300	1.236	1.123	1.032	1.023	0.888	0.911
34	0.280	0.344	0.322	0.331	1.037	1.150	1.073	0.990	0.852	0.820
35	0.320	0.350	0.366	0.342	0.937	1.053	0.995	0.978	1.001	1.022
MEDIUM - LOW TECHNOLOGICAL LEVEL										
23	0.454	0.741	0.315	0.390	0.521	0.264	0.957	0.960	1.480	1.962
25	0.372	0.334	0.318	0.256	1.226	1.076	0.963	0.957	0.838	0.931
26	0.282	0.270	0.262	0.281	0.986	0.888	0.945	0.942	0.990	1.067
27	0.331	0.320	0.318	0.307	1.192	1.138	0.963	0.962	0.845	0.867
28	0.221	0.247	0.184	0.187	1.122	1.075	0.969	0.956	0.922	0.940
36	0.154	0.201	0.174	0.224	0.964	0.956	0.973	0.961	1.036	1.053
LOW TECHNOLOGICAL LEVEL										
15	0.189	0.285	0.188	0.225	0.824	0.747	0.956	0.931	1.124	1.194
16	0.563	0.519	0.390	0.418	0.366	0.369	0.982	0.992	1.717	1.653
17	0.455	0.536	0.348	0.376	1.027	1.034	0.942	0.930	0.917	0.902
18	0.183	0.290	0.233	0.268	0.950	0.994	0.969	0.949	1.006	0.964
19	0.287	0.477	0.340	0.352	0.860	0.903	0.965	0.928	1.004	0.989
20	0.303	0.364	0.248	0.218	0.730	0.636	0.928	0.905	1.261	1.387
21	0.280	0.337	0.344	0.328	0.897	0.790	0.965	0.929	1.032	1.138
22	0.224	0.197	0.244	0.226	1.131	1.178	1.052	1.033	0.851	0.841
KNOWLEDGE - INTENSIVE SERVICES										
61	0.302	0.408	0.249	0.323	0.590	0.628	1.081	1.101	1.043	0.965
62	0.405	0.502	0.340	0.341	1.007	0.877	1.027	0.993	0.820	0.761
64	0.199	0.247	0.127	0.133	0.765	0.894	1.051	1.068	1.052	0.931
65	0.166	0.143	0.077	0.069	0.762	0.916	1.045	1.032	1.038	0.989
66	0.291	0.274	0.165	0.163	0.659	0.808	1.088	1.075	0.994	0.955
67	0.301	0.277	0.229	0.187	0.615	0.730	1.085	1.070	1.005	0.982
70	0.320	0.174	0.308	0.237	0.621	0.894	1.078	1.032	1.053	1.022
71	0.091	0.121	0.133	0.194	0.895	1.023	1.014	1.015	1.051	0.970
72	0.332	0.295	0.247	0.224	0.780	0.996	1.100	1.085	0.893	0.873
73	0.188	0.263	0.220	0.293	1.042	0.992	1.049	1.062	0.955	0.928
74	0.203	0.171	0.139	0.099	0.819	0.916	1.063	1.048	0.987	0.967
80	0.047	0.068	0.072	0.057	0.973	0.949	1.001	1.008	1.028	1.029
85	0.138	0.113	0.169	0.110	0.885	0.916	1.035	1.018	1.014	1.016
92	0.196	0.166	0.230	0.203	0.902	0.945	1.051	1.043	1.002	0.992

Table 7 (continuation)

NON KNOWLEDGE - INTENSIVE SERVICES										
50	0.078	0.106	0.097	0.077	0.870	0.873	0.974	0.965	1.107	1.103
51	0.124	0.062	0.141	0.106	0.914	1.016	1.034	1.003	0.999	0.988
52	0.038	0.043	0.072	0.081	0.896	0.919	1.000	0.994	1.058	1.052
55	0.119	0.124	0.177	0.155	0.787	0.806	0.997	0.999	1.144	1.126
60	0.102	0.083	0.086	0.100	0.933	0.973	1.022	1.005	1.003	1.000
63	0.307	0.166	0.336	0.191	0.624	1.026	1.078	1.029	1.074	0.932
75	0.138	0.119	0.119	0.116	0.786	0.816	1.024	1.009	1.104	1.112
90	0.305	0.090	0.387	0.159	1.110	0.990	0.967	0.996	0.930	1.007
91	0.281	0.235	0.156	0.171	0.655	0.715	1.079	1.043	1.027	1.085
93	0.034	0.049	0.066	0.061	0.892	0.916	1.001	0.991	1.057	1.058
95	0.150	0.190	0.138	0.120	0.864	0.929	1.038	1.051	1.018	0.962
99	0.438	0.435	0.408	0.426	0.460	0.625	1.124	1.110	0.953	0.896
AGRICULTURE, FORESTRY AND FISHING										
01	0.551	0.517	0.237	0.239	0.508	0.515	0.828	0.857	1.768	1.712
02	0.546	0.403	0.335	0.298	0.591	0.679	0.894	0.899	1.455	1.266
05	0.626	0.619	0.419	0.396	0.470	0.454	0.908	0.919	1.724	1.782
ENERGY AND OTHERS										
10	0.455	0.713	0.390	0.458	0.651	0.523	0.915	0.888	1.210	1.055
11	0.316	0.444	0.363	0.466	0.607	0.594	0.981	0.992	1.416	1.338
12	*	0.788	*	0.490	*	0.471	*	0.941	*	1.014
13	0.174	0.459	0.326	0.460	0.914	0.758	0.980	0.922	1.056	1.115
14	0.462	0.516	0.292	0.298	0.613	0.575	0.899	0.892	1.191	1.239
37	0.969	0.246	0.500	0.341	0.000	1.120	0.966	0.984	2.191	0.898
40	0.182	0.168	0.309	0.319	0.696	0.797	1.002	1.008	1.254	1.155
41	0.116	0.067	0.226	0.168	0.914	0.932	1.017	0.998	1.024	1.035
CONSTRUCTION										
45	0.104	0.119	0.101	0.085	0.828	0.822	0.971	0.968	1.149	1.147
* There are no workers in sector 12 in 1991										

Table 8. Values for the EG index

	MUNICIPALITIES		LOCAL LABOUR SYSTEMS		HERFINDHAL 1993	HERFINDHAL 2001
	EG 1991	EG 2001	EG 1991	EG 2001		
HIGH TECHNOLOGICAL LEVEL						
30	-0.418	-0.849	-0.411	-0.800	0.3453	0.2391
32	-0.051	-0.065	-0.046	-0.013	0.0539	0.0645
MEDIUM - HIGH TECHNOLOGICAL LEVEL						
24	-0.003	0.005	0.003	0.036	0.0064	0.0050
29	0.006	0.016	0.014	0.060	0.0038	0.0025
31	-0.011	0.012	-0.008	0.057	0.0141	0.0119
33	-0.005	-0.003	-0.003	0.038	0.0150	0.0083
34	-0.139	-0.064	-0.134	0.014	0.1686	0.1016
35	-0.069	-0.019	-0.047	0.011	0.0951	0.0545
MEDIUM - LOW TECHNOLOGICAL LEVEL						
23	-0.969	*	-0.815	*	0.5344	S
25	0.036	0.044	0.056	0.091	0.0067	0.0041
26	0.030	0.030	0.044	0.070	0.0134	0.0129
27	0.018	0.032	0.039	0.087	0.0200	0.0174
28	0.022	0.036	0.030	0.079	0.0010	0.0008
36	0.008	0.015	0.011	0.051	0.0020	0.0028
LOW TECHNOLOGICAL LEVEL						
15	0.013	0.029	0.017	0.067	0.0039	0.0039
17	0.076	0.090	0.097	0.157	0.0032	0.0018
18	0.006	0.027	0.008	0.068	0.0023	0.0027
19	0.018	0.061	0.028	0.088	0.0296	0.0253
20	0.048	0.054	0.061	0.103	0.0032	0.0023
21	0.008	0.030	0.017	0.067	0.0103	0.0066
22	0.022	0.009	0.028	0.049	0.0027	0.0025
ENERGY AND OTHERS						
10	-0.383	-0.468	-0.297	0.148	0.3402	0.5008
13	-0.226	0.015	-0.225	0.041	0.1902	0.3472
14	0.080	0.100	0.175	0.257	0.0571	0.0404
37	1.242	-0.041	1.272	0.001	0.0481	0.0359
40	-0.184	-0.293	-0.178	-0.253	0.1612	0.1966
41	-0.235	-0.252	-0.235	-0.205	0.1933	0.1703

S- Undisplayed data because of the statistical secret.
*- We could not calculate the EG index without having the Herfindahl index for a particular sector.

Table 9. Ten most and least specialized municipalities and descriptive statistics for the overall population

Municipalities	V_i 1991	Municipalities	V_i 2001	Municipalities	L_i 1991	Municipalities	L_i 2001	Municipalities	S_i 1991	Municipalities	S_i 1991
Ten most specialized municipalities											
Febró, la	6.266	Nalec	5.360	Febró, la	0.966	Senan	0.952	Vajol, la	0.916	Renau	0.851
Forès	6.266	Cabó	5.139	Forès	0.966	Tiurana	0.926	Fígols	0.826	Senan	0.765
Montornès de Segarra	6.050	Llobera	4.767	Farrera	0.960	Sant Agustí de Lluçanès	0.907	Massanes	0.739	Gisclareny	0.749
Sant Andreu Salou	5.983	Tiurana	4.760	Montornès de Segarra	0.932	Cabó	0.902	Riba, la	0.697	Tiurana	0.747
Oliola	5.911	Aspa	4.709	Cava	0.926	Nalec	0.901	Vilamòs	0.694	Bellprat	0.715
Farrera	5.856	Montornès de Segarra	4.651	Sales de Llierca	0.923	Renau	0.889	Febró, la	0.690	Nalec	0.713
Cabó	5.827	Oliola	4.628	Sant Andreu Salou	0.921	Bellprat	0.882	Forès	0.690	Cabó	0.707
Abella de la Conca	5.721	Torms, els	4.614	Toses	0.912	Canejan	0.867	Castellar de n'Hug	0.682	Juià	0.701
Conca de Dalt	5.698	Ossó de Sió	4.608	Oliola	0.910	Llorac	0.867	Farrera	0.678	Vilaverd	0.698
Vilanova de Prades	5.652	Castellar de la Ribera	4.597	Senan	0.908	Bausen	0.862	Sant Bartomeu del Grau	0.676	Montornès de Segarra	0.695
Ten least specialized municipalities											
Sant Cugat del Vallès	1.024	Molins de Rei	0.968	Granollers	0.128	Granollers	0.115	Sant Martí Sarroca	0.158	Sant Martí Sarroca	0.147
Molins de Rei	1.036	Caldes de Montbui	0.974	Badalona	0.131	Hospitalet de Llobregat, l'	0.121	Santa Pau	0.163	Riudoms	0.159
Granollers	1.037	Vilassar de Dalt	0.978	Sant Boi de Llobregat	0.144	Viladecans	0.124	Juneda	0.184	Subirats	0.187
Barcelona	1.049	Sant Just Desvern	0.983	Reus	0.144	Sant Boi de Llobregat	0.128	Riudoms	0.186	Sant Jaume dels Domenys	0.197
Sant Just Desvern	1.060	Esparreguera	0.988	Mollet del Vallès	0.147	Manresa	0.128	Sant Jaume dels Domenys	0.189	Vinyols i els Arcs	0.199
Esplugues de Llobregat	1.083	Granollers	0.999	Manresa	0.155	Badalona	0.131	Vimbodí	0.195	Castellví de la Marca	0.200
Sant Boi de Llobregat	1.091	Barberà del Vallès	1.003	Barcelona	0.157	Reus	0.133	Palau d'Anglesola, el	0.202	Santa Pau	0.209
Canovelles	1.091	Prat de Llobregat, el	1.009	Hospitalet de Llobregat, l'	0.159	Vilafranca del Penedès	0.136	Alpicat	0.203	Alpicat	0.211
Sant Joan Despí	1.099	Sta Maria Palautordera	1.028	Terrassa	0.165	Sabadell	0.139	Vilanova de Bellpuig	0.204	Vilabella	0.213
Cornellà de Llobregat	1.111	Garriga, la	1.029	Molins de Rei	0.170	Terrassa	0.139	Selva del Camp, la	0.210	Bell-lloc d'Urgell	0.214
Descriptive statistics for the overall population											
Average	2.712	Average	2.110	Average	0.534	Average	0.477	Average	0.420	Average	0.401
Min	1.024	Min	0.968	Min	0.128	Min	0.115	Min	0.158	Min	0.147
Max	6.266	Max	5.360	Max	0.966	Max	0.952	Max	0.916	Max	0.851
Coefficient of variation	0.439	Coefficient of variation	0.402	Coefficient of variation	0.337	Coefficient of variation	0.354	Coefficient of variation	0.242	Coefficient of variation	0.266
Spearman rank											
Vi 1991 - Li 1991		0.935		Vi 2001 - Li 2001		0.912		Vi 1991 - Vi 2001		0.863	
Vi 1991 - Si 1991		0.336		Vi 2001 - Si 2001		0.575		Li 1991 - Li 2001		0.898	
Li 1991 - Si 1991		0.445		Li 2001 - Si 2001		0.684		Si 1991 - Si 2001		0.751	

Table 10. Ten most and least specialized LLS and descriptive statistics for the overall population

LLS	V_i 1991	LLS	V_i 2001	LLS	L_i 1991	LLS	L_i 2001	LLS	S_i 1991	LLS	S_i 1991
Ten most specialized LLS											
Oliana	3.425	Guissona	2.507	Oliana	0.623	Guissona	0.518	Oliana	0.537	Guissona	0.447
Gandesa	2.876	Jonquera	1.935	Guissona	0.540	Jonquera	0.428	Jonquera	0.467	Hostalric	0.424
Hostalric	2.850	Gandesa	1.920	Gandesa	0.506	Gandesa	0.417	Hostalric	0.457	Jonquera	0.417
Guissona	2.615	Artesa de Segre	1.783	Flix	0.487	Hostalric	0.416	Guissona	0.449	Flix	0.342
Artesa de Segre	2.501	Vielha e Mijaran	1.773	Hostalric	0.477	Sta Coloma de Queralt	0.410	Flix	0.422	Vielha e Mijaran	0.317
Falset	2.228	Sta Coloma de Queralt	1.740	Artesa de Segre	0.453	Flix	0.403	Gandesa	0.402	Sta Coloma de Queralt	0.316
Flix	1.984	Falset	1.717	Falset	0.446	Artesa de Segre	0.396	Falset	0.347	Gandesa	0.315
Ponts	1.960	Hostalric	1.705	Pont de Suert	0.442	Falset	0.386	Artesa de Segre	0.343	Oliana	0.312
Sort	1.926	Puigcerdà	1.669	Sort	0.441	Oliana	0.376	Castell-Platja d'Aro	0.341	Sant Cugat del Vallès	0.297
Puigcerdà	1.873	Flix	1.624	Jonquera	0.436	Ponts	0.375	Vielha e Mijaran	0.337	Artesa de Segre	0.294
Ten least specialized LLS											
Sant Cugat del Vallès	1.011	Sabadell	0.946	Badalona	0.120	Badalona	0.117	Girona	0.132	Girona	0.101
Baix Llobregat	1.016	Caldes de Montbui	0.954	Girona	0.130	Girona	0.122	Borges Blanques	0.151	Reus	0.139
Granollers	1.020	Sant Cugat del Vallès	0.956	Baix Llobregat	0.134	Baix Llobregat	0.132	Reus	0.155	Vendrell	0.145
Barcelona	1.049	Granollers	0.968	Barcelona	0.157	Terrassa	0.135	Tortosa	0.179	Seu d'Urgell	0.150
Caldes de Montbui	1.067	Baix Llobregat	0.974	Reus	0.159	Reus	0.139	Vilafranca del Penedès	0.181	Tortosa	0.154
Cerdanyola del Vallès	1.077	Cerdanyola del Vallès	1.015	Sabadell	0.163	Mataró	0.142	Balaguer	0.182	Figueres	0.156
Girona	1.131	Manresa	1.030	Terrassa	0.164	Manresa	0.151	Figueres	0.185	Manresa	0.159
Manresa	1.134	Valls	1.053	Manresa	0.169	Vilanova i la Geltrú	0.162	Olot	0.186	Balaguer	0.162
Sabadell	1.137	Vilafranca del Penedès	1.096	Vilanova i la Geltrú	0.181	Sabadell	0.163	Seu d'Urgell	0.192	Pineda de Mar	0.166
Badalona	1.137	Sant Celoni	1.098	Granollers	0.181	Barcelona	0.168	Pobla de Segur	0.194	Berga	0.171
Descriptive statistics for the overall population											
Average	1.596	Average	1.362	Average	0.302	Average	0.271	Average	0.265	Average	0.233
Min	1.011	Min	0.946	Min	0.120	Min	0.117	Min	0.132	Min	0.101
Max	3.425	Max	2.507	Max	0.623	Max	0.518	Max	0.537	Max	0.447
Coefficient of variation	0.301	Coefficient of variation	0.215	Coefficient of variation	0.365	Coefficient of variation	0.342	Coefficient of variation	0.306	Coefficient of variation	0.298
Spearman rank											
Vi 1991 - Li 1991		0.906		Vi 2001 - Li 2001		0.834		Vi 1991 - Vi 2001		0.890	
Vi 1991 - Si 1991		0.522		Vi 2001 - Si 2001		0.430		Li 1991 - Li 2001		0.964	
Li 1991 - Si 1991		0.445		Li 2001 - Si 2001		0.654		Si 1991 - Si 2001		0.892	

Table 11. Descriptive statistics for the L_{ij} measure by sectors and Moran's I statistic. Municipalities, 1991

Code	Average	Min	Max	Coefficiet of variation	Moran's I	Prob (Moran's I)
HIGH TECHNOLOGICAL LEVEL						
30	0.246	0.000	15.855	4.262	4.711	0.000
32	0.416	0.000	61.824	5.799	7.011	0.000
MEDIUM - HIGH TECHNOLOGICAL LEVEL						
24	0.505	0.000	14.126	2.169	9.774	0.000
29	0.535	0.000	18.082	1.868	10.512	0.000
31	0.567	0.000	15.270	1.718	5.608	0.000
33	0.359	0.000	13.995	2.884	7.192	0.000
34	0.276	0.000	13.600	3.569	6.712	0.000
35	0.666	0.000	81.489	5.730	8.038	0.000
MEDIUM - LOW TECHNOLOGICAL LEVEL						
23	1.796	0.000	278.295	8.383	8.485	0.000
25	0.596	0.000	11.209	2.253	14.011	0.000
26	1.252	0.000	38.062	2.661	9.107	0.000
27	0.519	0.000	21.409	2.729	10.755	0.000
28	0.693	0.000	8.198	1.356	14.364	0.000
36	0.989	0.000	23.379	1.560	8.962	0.000
LOW TECHNOLOGICAL LEVEL						
15	1.134	0.000	13.145	1.366	8.931	0.000
16	0.516	0.000	80.962	7.746	6.209	0.000
17	0.985	0.000	17.753	2.121	18.216	0.000
18	1.039	0.000	14.461	1.707	10.045	0.000
19	0.474	0.000	38.071	4.492	3.258	0.001
20	1.858	0.000	32.786	1.961	7.469	0.000
21	1.146	0.000	84.996	4.935	9.847	0.000
22	0.291	0.000	7.564	2.239	14.163	0.000
KNOWLEDGE - INTENSIVE SERVICES						
61	0.414	0.000	61.519	5.911	-0.561	0.575
62	0.389	0.000	60.498	7.810	-0.107	0.915
64	0.502	0.000	9.470	1.596	0.927	0.354
65	0.354	0.000	2.306	1.103	3.492	0.000
66	0.207	0.000	20.724	3.702	-0.256	0.798
67	0.312	0.000	35.925	5.369	-0.248	0.804
70	0.366	0.000	10.158	2.701	13.410	0.000
71	0.478	0.000	11.625	2.423	1.881	0.060
72	0.175	0.000	7.934	2.871	4.504	0.000
73	0.466	0.000	17.575	2.784	1.131	0.258
74	0.264	0.000	2.060	1.158	12.355	0.000
80	0.590	0.000	4.631	0.853	4.520	0.000
85	0.285	0.000	3.282	1.410	3.307	0.001
92	0.630	0.000	17.148	2.526	6.379	0.000
NON KNOWLEDGE - INTENSIVE SERVICES						
50	0.813	0.000	18.259	1.387	2.736	0.006
51	0.508	0.000	9.131	1.487	11.069	0.000
52	0.621	0.000	3.489	0.671	8.376	0.000
55	1.256	0.000	10.721	1.180	13.807	0.000
60	0.601	0.000	10.600	1.171	3.468	0.001
63	0.360	0.000	28.073	3.904	1.810	0.070
75	0.538	0.000	7.692	1.036	5.693	0.000
90	1.146	0.000	315.172	11.352	-0.110	0.913
91	0.550	0.000	19.229	2.290	-0.027	0.978
93	0.677	0.000	6.158	1.036	3.153	0.002
95	0.632	0.000	9.032	1.486	8.275	0.000
99	0.280	0.000	84.169	11.161	-0.607	0.544
AGRICULTURE, FORESTRY AND FISHING						
01	9.206	0.000	29.666	0.862	23.687	0.000
02	5.360	0.000	325.666	4.020	5.409	0.000
05	0.896	0.000	93.697	7.110	6.576	0.000

Table 11 (continuation)

ENERGY AND OTHERS						
10	3.321	0.000	632.473	8.975	11.064	0.000
11	3.013	0.000	1964.734	21.329	3.755	0.000
13	2.380	0.000	215.124	5.854	4.768	0.000
14	3.047	0.000	232.401	4.802	1.417	0.156
37	0.055	0.000	52.334	30.757	-0.586	0.558
40	0.987	0.000	70.824	4.017	3.976	0.000
41	0.597	0.000	47.699	4.122	2.761	0.006
CONSTRUCTION						
45	1.272	0.000	6.079	0.693	11.464	0.000
* There are no workers in sector 12 in 1991						

Table 12. Descriptive statistics for the L_{ij} measure by sectors and Moran's I statistic. Municipalities, 2001

Code	Average	Min	Max	Coefficient of variation	Moran's I	Prob (Moran's I)
HIGH TECHNOLOGICAL LEVEL						
30	0.569	0.000	113.858	7.664	2.277	0.023
32	0.424	0.000	40.143	5.086	9.052	0.000
MEDIUM - HIGH TECHNOLOGICAL LEVEL						
24	0.546	0.000	11.764	2.182	11.226	0.000
29	0.683	0.000	9.534	1.648	11.479	0.000
31	0.700	0.000	23.504	2.630	2.452	0.014
33	0.543	0.000	56.440	5.407	1.612	0.107
34	0.473	0.000	18.801	2.848	12.881	0.000
35	0.811	0.000	93.911	5.205	5.124	0.000
MEDIUM - LOW TECHNOLOGICAL LEVEL						
23	1.331	0.000	531.184	13.735	16.010	0.000
25	0.915	0.000	19.895	2.247	6.360	0.000
26	1.785	0.000	50.165	2.650	6.141	0.000
27	0.746	0.000	22.031	2.646	3.354	0.001
28	0.919	0.000	12.592	1.280	11.581	0.000
36	1.066	0.000	40.975	2.164	9.175	0.000
LOW TECHNOLOGICAL LEVEL						
15	1.806	0.000	26.622	1.471	7.340	0.000
16	0.310	0.000	52.023	7.639	2.853	0.004
17	1.307	0.000	41.021	2.738	16.526	0.000
18	1.063	0.000	22.947	1.844	11.383	0.000
19	0.841	0.000	52.704	4.041	2.987	0.003
20	2.487	0.000	76.485	2.218	4.574	0.000
21	1.756	0.000	126.191	4.936	12.006	0.000
22	0.461	0.000	8.973	2.008	13.703	0.000
KNOWLEDGE - INTENSIVE SERVICES						
61	0.311	0.000	21.102	4.618	1.492	0.136
62	0.288	0.000	46.377	7.991	0.502	0.616
64	0.346	0.000	6.303	1.300	3.292	0.001
65	0.426	0.000	2.822	1.013	3.593	0.000
66	0.246	0.000	6.333	1.988	1.809	0.070
67	0.251	0.000	11.658	2.915	0.186	0.853
70	0.471	0.000	9.918	1.898	9.411	0.000
71	0.476	0.000	39.642	4.206	1.146	0.252
72	0.224	0.000	6.545	1.929	8.697	0.000
73	0.651	0.000	120.010	8.534	-0.538	0.591
74	0.347	0.000	3.108	0.918	14.013	0.000
80	0.652	0.000	3.441	0.711	5.993	0.000
85	0.470	0.000	4.996	1.134	1.929	0.054
92	0.609	0.000	14.048	2.070	7.001	0.000

Table 12 (continuation)

NON KNOWLEDGE - INTENSIVE SERVICES						
50	0.912	0.000	16.726	1.244	1.834	0.067
51	0.723	0.000	13.153	1.141	11.197	0.000
52	0.648	0.000	3.920	0.666	9.990	0.000
55	1.401	0.000	12.906	0.955	13.099	0.000
60	0.678	0.000	15.486	1.416	3.459	0.001
63	0.492	0.000	19.121	2.224	4.848	0.000
75	0.812	0.000	11.274	0.981	6.490	0.000
90	0.709	0.000	54.723	3.418	1.425	0.154
91	0.710	0.000	27.027	2.841	-0.166	0.868
93	0.755	0.000	13.634	1.103	2.093	0.036
95	0.641	0.000	12.457	1.308	7.123	0.000
99	0.213	0.000	32.799	8.805	2.992	0.003
AGRICULTURE, FORESTRY AND FISHING						
01	9.588	0.000	42.088	1.003	23.855	0.000
02	6.253	0.000	534.598	4.213	6.868	0.000
05	1.155	0.000	111.399	5.982	7.070	0.000
ENERGY AND OTHERS						
10	2.445	0.000	1024.210	15.124	0.541	0.589
11	9.800	0.000	8881.124	29.470	0.531	0.596
13	0.746	0.000	122.105	9.696	0.509	0.611
14	3.035	0.000	229.231	4.658	2.584	0.010
37	0.820	0.000	113.684	6.182	0.918	0.358
40	0.888	0.000	115.583	5.313	2.145	0.032
41	0.631	0.000	20.782	2.471	4.324	0.000
CONSTRUCTION						
45	1.328	0.000	5.294	0.563	8.813	0.000

Table 13. Descriptive statistics for the L_{ij} measure by sectors and Moran's I statistic. LLS, 1991

Code	Average	Min	Max	Coefficient of variation	Moran's I	Prob (Moran's I)
HIGH TECHNOLOGICAL LEVEL						
30	0.330	0.000	2.054	1.288	7.588	0.000
32	0.609	0.000	3.962	1.509	3.355	0.001
MEDIUM - HIGH TECHNOLOGICAL LEVEL						
24	0.661	0.053	5.515	1.289	2.800	0.005
29	0.907	0.000	14.955	2.103	2.112	0.035
31	0.850	0.119	5.224	0.864	2.537	0.011
33	0.512	0.000	4.205	1.274	5.282	0.000
34	0.452	0.000	3.069	1.407	2.793	0.005
35	0.950	0.000	7.294	1.780	3.672	0.000
MEDIUM - LOW TECHNOLOGICAL LEVEL						
23	0.977	0.000	10.420	1.829	0.487	0.627
25	0.879	0.000	4.823	1.288	2.971	0.003
26	1.223	0.000	12.246	1.422	0.398	0.691
27	0.685	0.000	3.755	1.270	3.517	0.000
28	0.834	0.095	2.651	0.673	4.309	0.000
36	0.987	0.195	3.180	0.684	1.218	0.223
LOW TECHNOLOGICAL LEVEL						
15	1.240	0.302	7.820	0.894	1.806	0.071
16	0.861	0.000	17.336	2.900	0.621	0.535
17	1.071	0.000	10.892	1.702	3.830	0.000
18	1.271	0.073	7.664	0.963	1.274	0.203
19	0.911	0.000	16.696	2.412	1.616	0.106
20	1.918	0.265	11.282	1.159	5.626	0.000
21	1.008	0.000	8.651	1.599	0.950	0.342
22	0.429	0.000	1.544	0.916	6.218	0.000

Table 13 (continuation)

KNOWLEDGE - INTENSIVE SERVICES						
61	0.663	0.000	3.160	0.957	1.731	0.083
62	0.264	0.000	3.947	2.024	1.507	0.132
64	0.668	0.159	1.506	0.458	1.929	0.054
65	0.762	0.278	1.473	0.276	0.031	0.975
66	0.457	0.000	1.856	0.644	0.533	0.594
67	0.627	0.000	3.806	0.954	0.255	0.798
70	0.705	0.000	5.204	1.431	6.025	0.000
71	0.821	0.000	2.725	0.515	0.439	0.661
72	0.307	0.000	1.938	1.057	5.271	0.000
73	0.565	0.000	3.485	0.930	3.537	0.000
74	0.520	0.087	1.594	0.511	3.498	0.000
80	0.908	0.279	2.003	0.279	2.072	0.038
85	0.584	0.093	1.400	0.594	1.580	0.114
92	0.885	0.139	4.544	1.020	5.407	0.000
NON KNOWLEDGE - INTENSIVE SERVICES						
50	1.186	0.234	3.001	0.396	1.701	0.089
51	0.616	0.059	1.456	0.500	2.302	0.021
52	0.920	0.371	1.421	0.252	1.811	0.070
55	1.285	0.442	5.020	0.718	5.516	0.000
60	0.758	0.219	1.425	0.310	2.475	0.013
63	0.898	0.042	25.314	3.569	3.098	0.002
75	0.863	0.291	3.153	0.504	2.203	0.028
90	1.191	0.000	10.034	1.799	2.577	0.010
91	0.614	0.000	1.798	0.567	1.311	0.190
93	0.952	0.426	1.626	0.238	3.547	0.000
95	0.780	0.098	1.766	0.488	3.563	0.000
99	0.487	0.000	7.275	2.395	-0.684	0.494
AGRICULTURE, FORESTRY AND FISHING						
01	3.490	0.058	13.160	0.860	7.272	0.000
02	3.138	0.000	31.988	1.702	2.997	0.003
05	1.516	0.000	22.806	2.477	1.816	0.069
ENERGY AND OTHERS						
10	1.192	0.000	20.528	2.582	0.947	0.343
11	0.884	0.000	6.703	1.609	1.308	0.191
13	1.178	0.000	11.796	1.538	-0.686	0.493
14	1.501	0.000	15.678	1.496	-0.742	0.458
37	0.521	0.000	31.756	7.810	-0.868	0.385
40	1.942	0.103	28.095	2.095	3.306	0.001
41	0.699	0.000	2.220	0.801	3.586	0.000
CONSTRUCTION						
45	1.336	0.695	2.828	0.376	4.517	0.000

Table 14. Descriptive statistics for the L_{ij} measure by sectors and Moran's I statistic. LLS, 2001

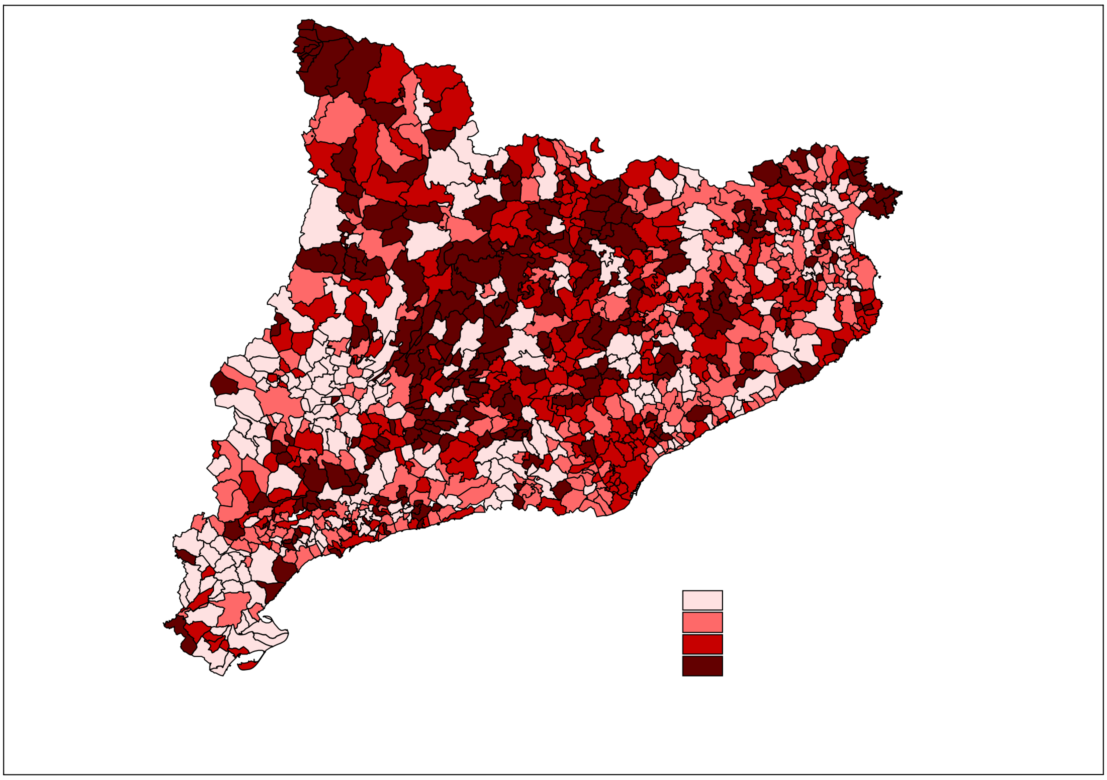
Code	Average	Min	Max	Coefficient of variation	Moran's I	Prob (Moran's I)
HIGH TECHNOLOGICAL LEVEL						
30	0.721	0.000	4.548	1.522	2.641	0.008
32	0.569	0.000	3.631	1.588	6.545	0.000
MEDIUM - HIGH TECHNOLOGICAL LEVEL						
24	0.657	0.000	4.983	1.400	3.254	0.001
29	0.738	0.000	7.711	1.489	3.188	0.001
31	1.245	0.000	14.485	1.810	0.831	0.406
33	0.489	0.000	2.382	1.134	3.434	0.001
34	0.658	0.000	4.715	1.461	1.761	0.078
35	0.822	0.000	6.361	1.549	3.231	0.001

Table 14 (continuation)

MEDIUM - LOW TECHNOLOGICAL LEVEL						
23	0.795	0.000	20.978	3.404	2.520	0.012
25	0.988	0.000	3.942	0.965	1.485	0.137
26	1.809	0.194	19.306	1.788	0.372	0.710
27	0.942	0.000	11.512	1.664	0.780	0.436
28	0.930	0.088	2.771	0.665	5.068	0.000
36	1.057	0.138	8.221	1.132	-1.017	0.309
LOW TECHNOLOGICAL LEVEL						
15	1.620	0.436	15.268	1.262	1.227	0.220
16	0.583	0.000	14.967	3.341	-0.019	0.985
17	1.117	0.000	12.510	1.903	3.157	0.002
18	1.358	0.044	9.505	1.193	1.220	0.223
19	1.148	0.000	15.671	2.054	0.072	0.942
20	2.219	0.276	10.519	0.902	4.170	0.000
21	1.428	0.000	12.013	1.718	0.494	0.621
22	0.496	0.035	1.807	0.853	5.956	0.000
KNOWLEDGE - INTENSIVE SERVICES						
61	0.393	0.000	3.531	1.558	0.782	0.434
62	0.243	0.000	4.715	2.510	1.472	0.141
64	0.479	0.058	1.843	0.550	4.700	0.000
65	0.756	0.440	1.412	0.257	1.210	0.226
66	0.447	0.000	1.933	0.651	2.656	0.008
67	0.565	0.000	1.936	0.689	0.582	0.560
70	0.786	0.000	3.977	0.944	5.084	0.000
71	0.664	0.000	1.474	0.672	2.890	0.004
72	0.379	0.000	1.933	0.971	6.692	0.000
73	0.580	0.000	3.566	1.155	0.761	0.447
74	0.588	0.258	1.585	0.374	5.082	0.000
80	0.896	0.496	1.538	0.204	1.281	0.200
85	0.754	0.122	1.516	0.388	0.052	0.959
92	0.765	0.089	3.417	0.865	6.373	0.000
NON KNOWLEDGE - INTENSIVE SERVICES						
50	1.160	0.616	2.621	0.291	2.525	0.012
51	0.776	0.276	1.470	0.371	3.601	0.000
52	0.996	0.406	2.612	0.323	3.433	0.001
55	1.272	0.469	3.644	0.603	5.690	0.000
60	0.782	0.239	2.295	0.395	2.079	0.038
63	0.606	0.000	2.173	0.731	2.187	0.029
75	1.034	0.284	2.902	0.438	4.322	0.000
90	0.836	0.000	1.940	0.558	3.866	0.000
91	0.676	0.000	2.257	0.641	2.085	0.037
93	1.018	0.483	1.647	0.218	2.923	0.003
95	0.687	0.144	1.592	0.436	3.992	0.000
99	0.307	0.000	4.593	2.484	0.302	0.763
AGRICULTURE, FORESTRY AND FISHING						
01	3.439	0.128	13.240	0.882	7.386	0.000
02	2.208	0.000	20.090	1.493	2.636	0.008
05	1.676	0.000	18.209	2.162	1.615	0.106
ENERGY AND OTHERS						
10	0.967	0.000	25.683	4.063	2.090	0.037
11	0.538	0.000	11.597	3.609	-0.838	0.402
13	1.606	0.000	34.109	3.561	0.450	0.653
14	1.470	0.000	16.638	1.604	0.851	0.395
37	0.705	0.000	6.915	1.558	2.308	0.021
40	1.710	0.095	40.776	3.059	0.754	0.451
41	0.786	0.000	2.197	0.591	3.000	0.003
CONSTRUCTION						
45	1.349	0.729	2.697	0.310	3.693	0.000

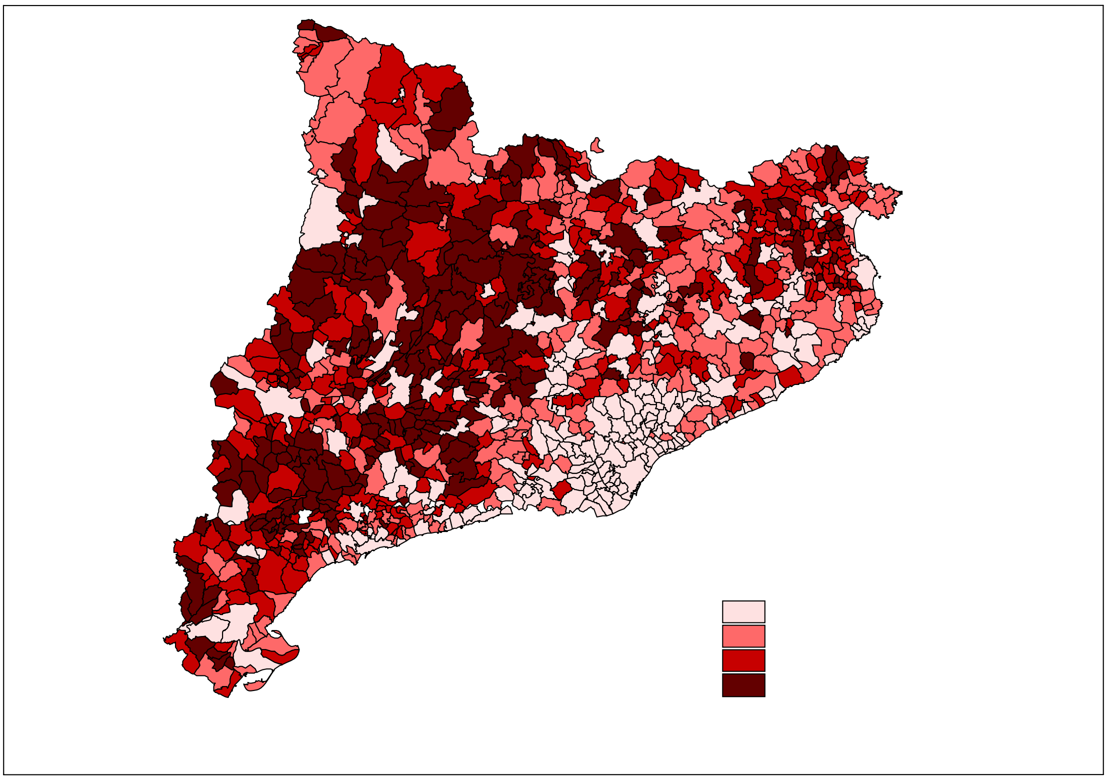
Map 1. Krugman Specialization Index, Municipalities, 1991

Moran's I: z-value=9.763 (p: 0.000)



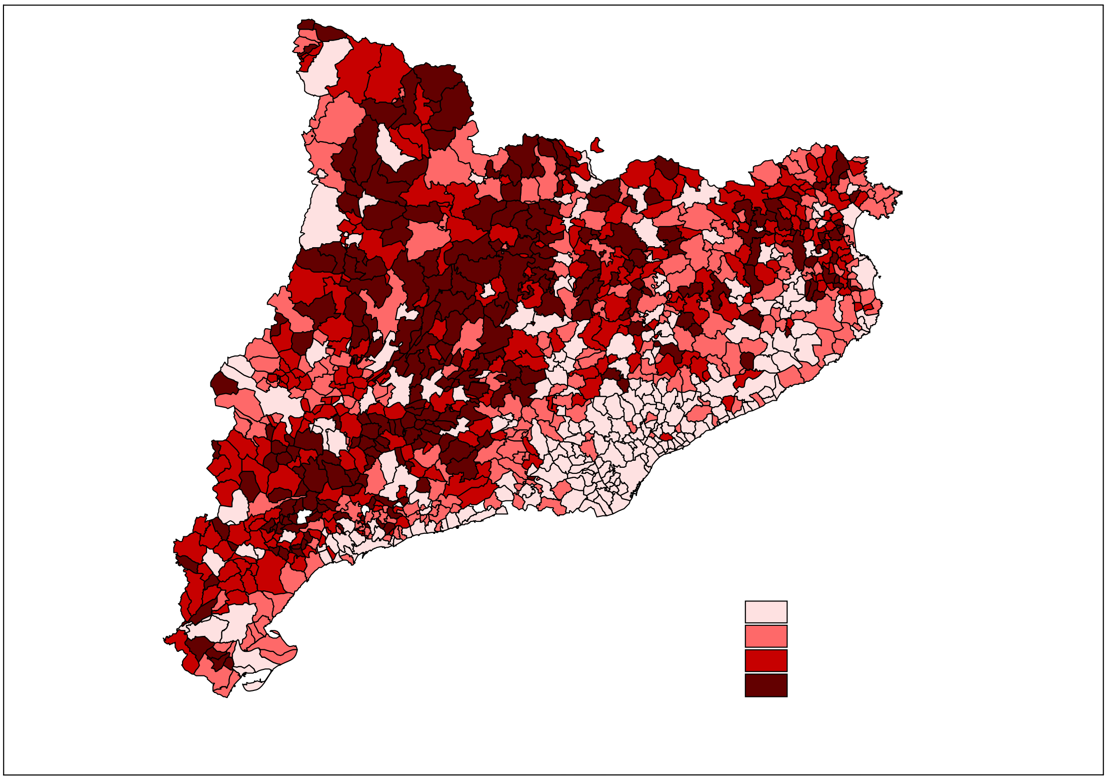
Map 2. Specialization measure (Hallet, 2000), Municipalities, 1991

Moran's I: z-value=21.135 (p: 0.000)



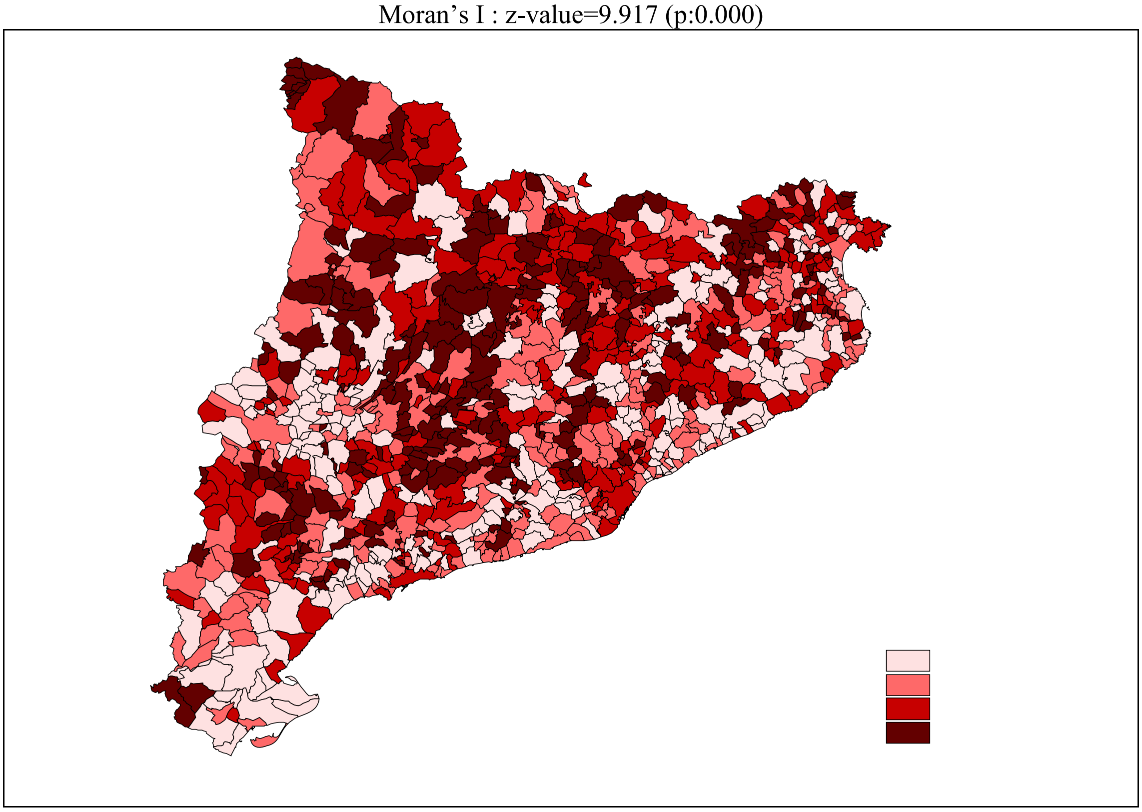
Map 3. Li, Municipalities, 1991

Moran's I: z-value=20.964 (p: 0.000)



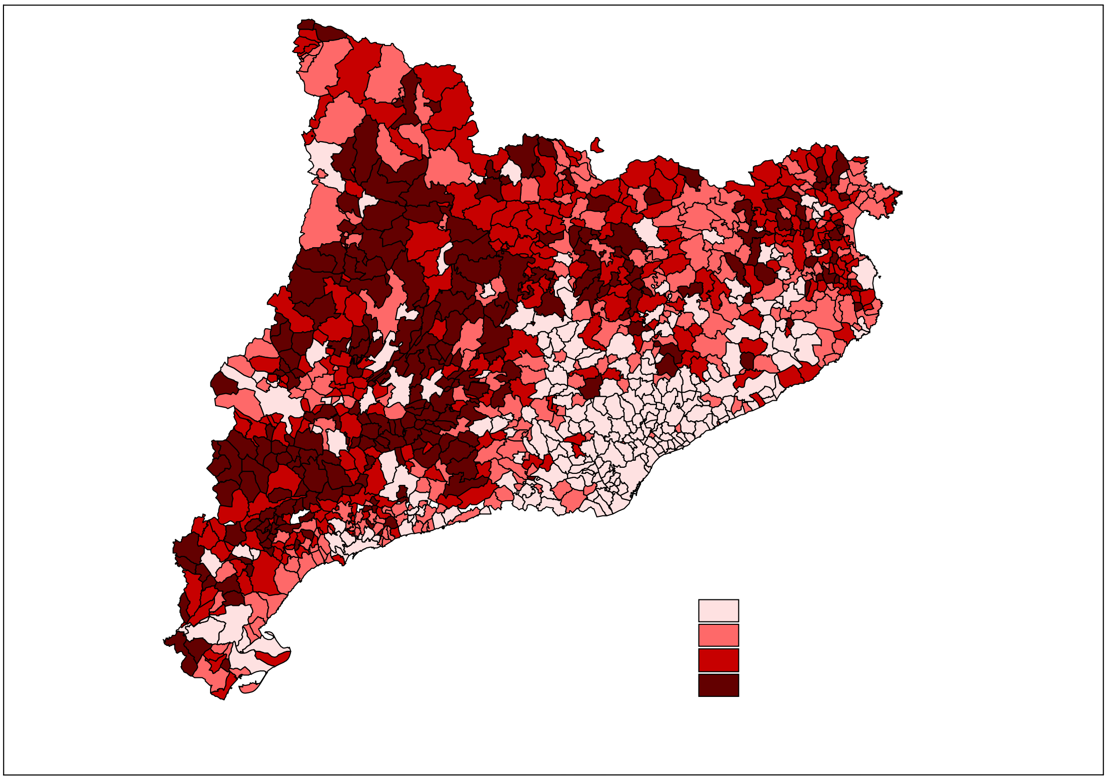
Map 4. Krugman Specialization Index, Municipalities, 2001

Moran's I : z-value=9.917 (p:0.000)



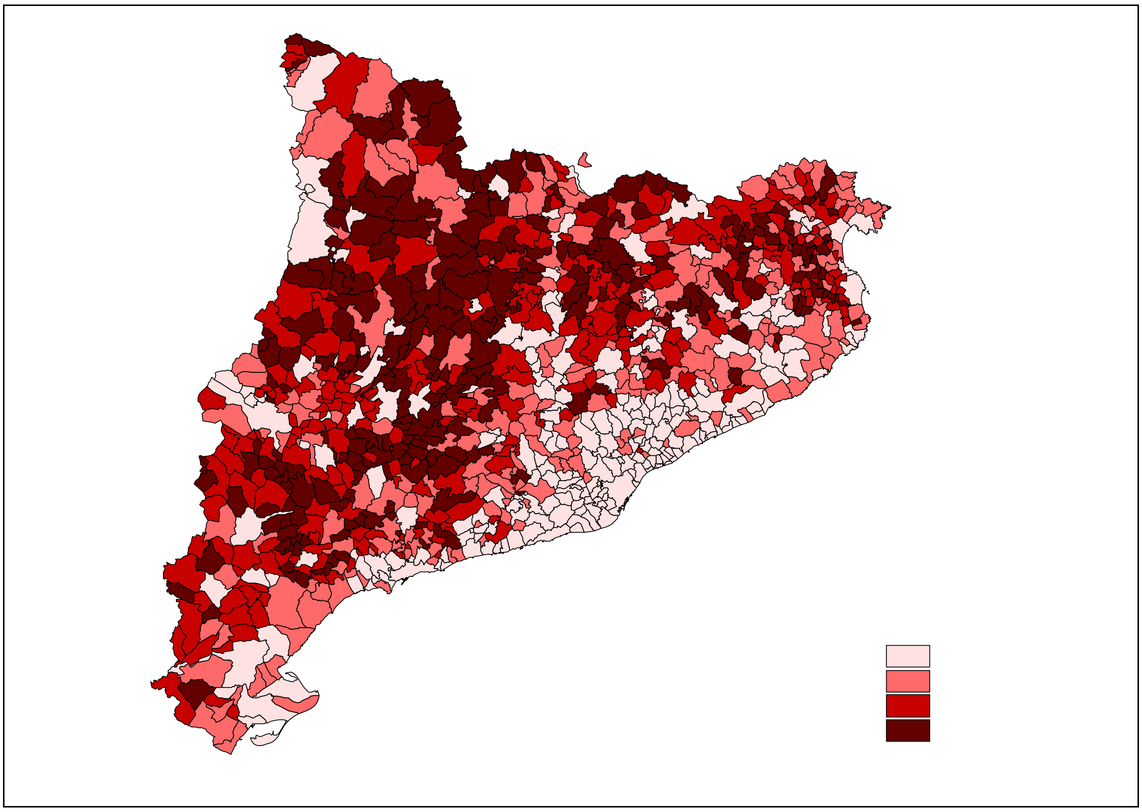
Map 5. Specialization measure (Hallet, 2000), Municipalities, 2001

Moran's I : z-value=21.342 (p:0.000)



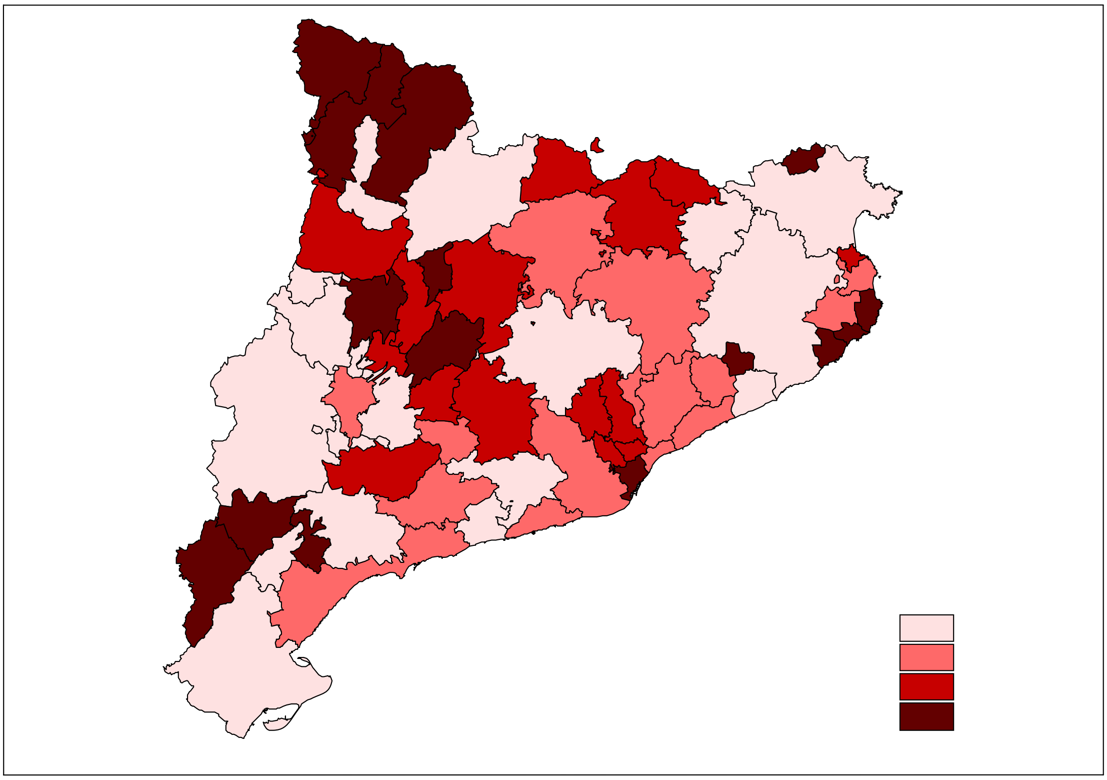
Map 6. L_i, Municipalities, 2001

Moran's I : z-value=22.411 (p:0.000)



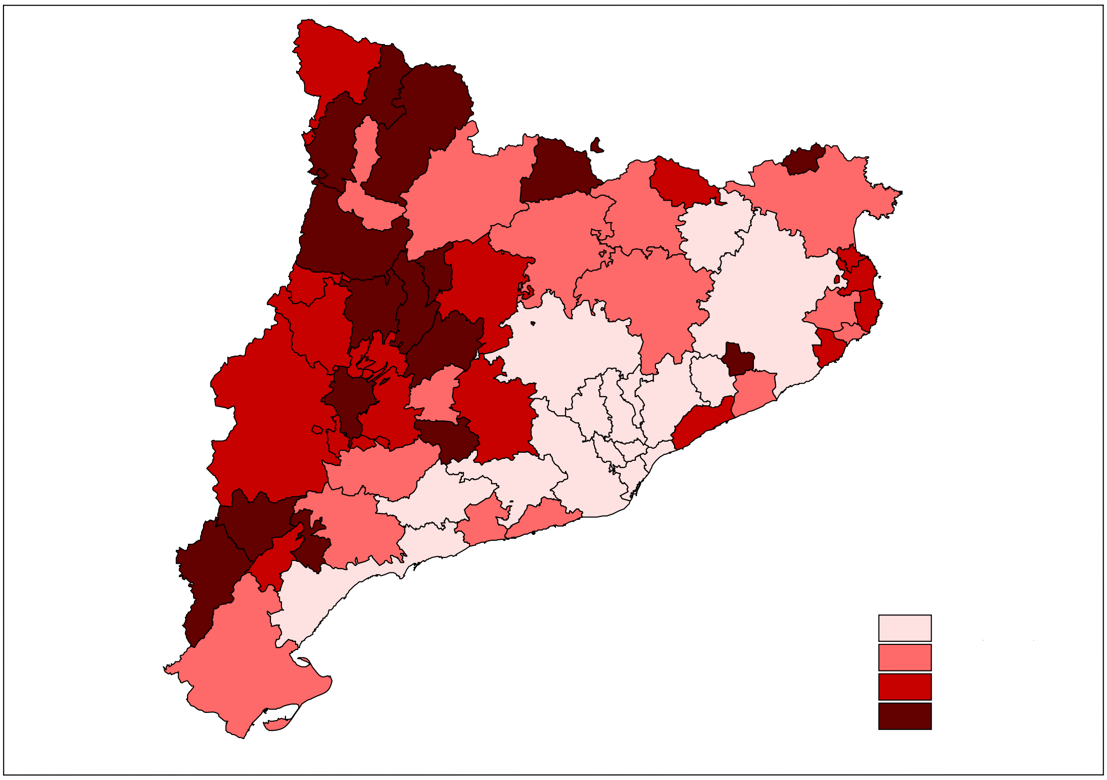
Map 7. Krugman Specialization Index, LLS, 1991

Moran's I: z-value= -0.4390 (p: 0.661)



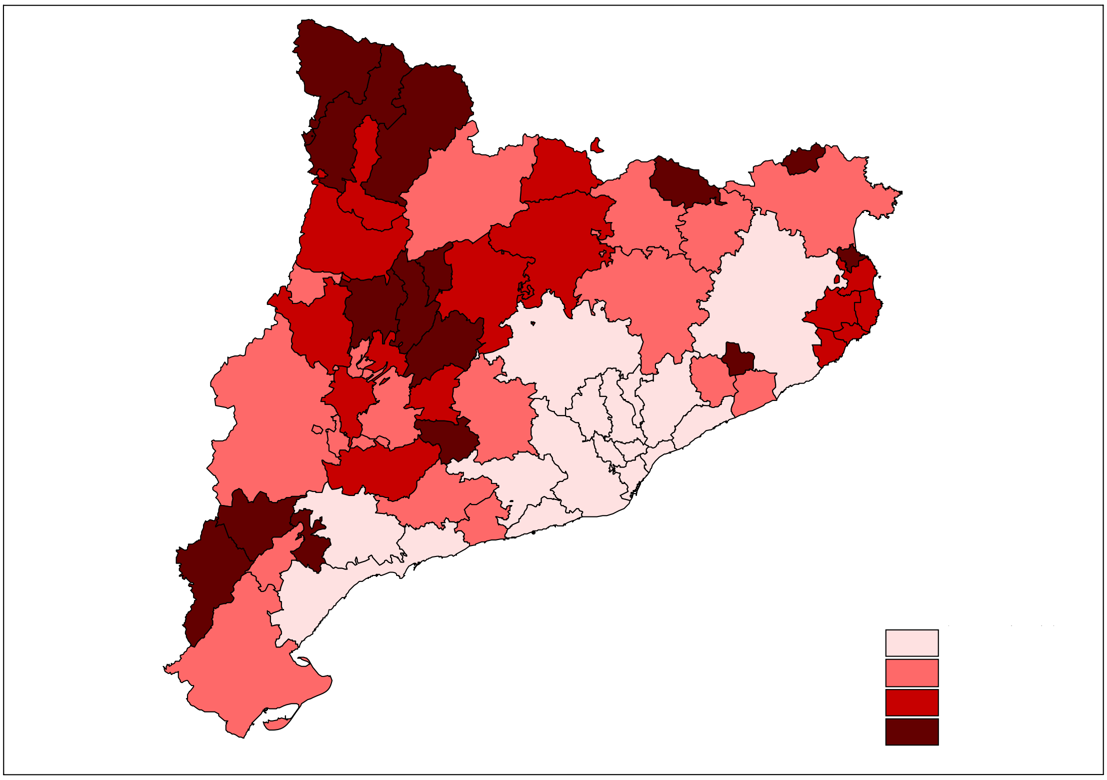
Map 8. Hallet Specialization measure, LLS, 1991

Moran's I: z-value=2.878 (p: 0.004)



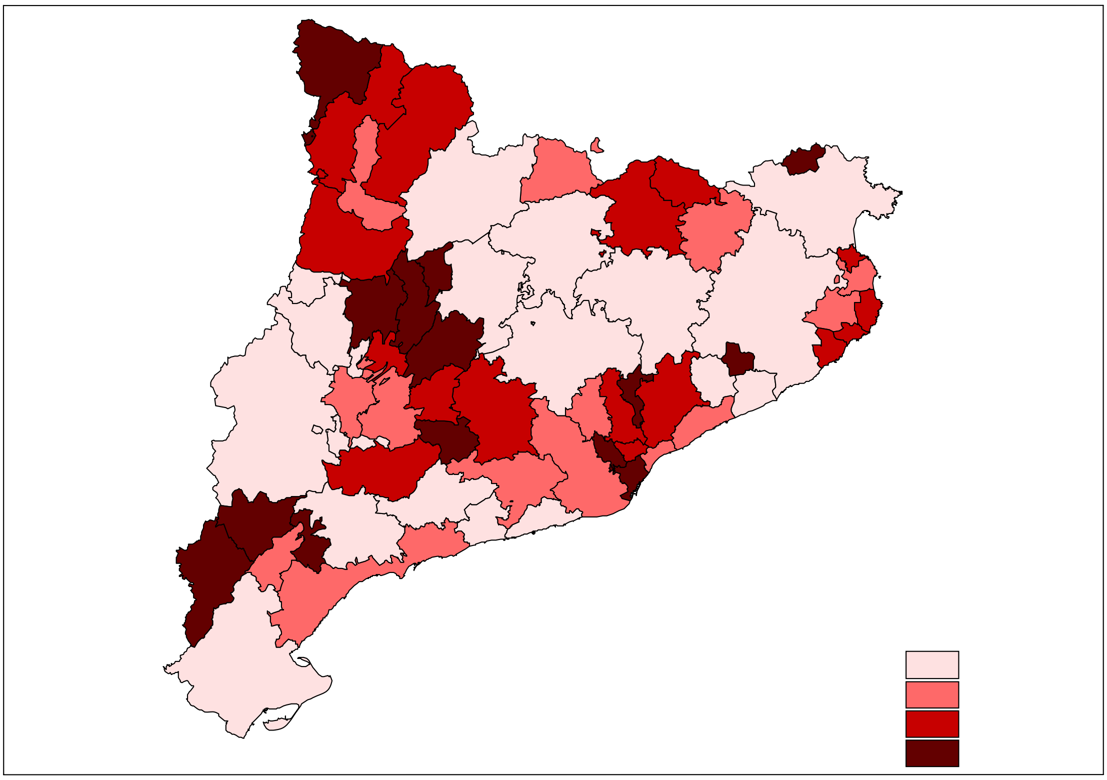
Map 9. Li, LLS, 1991

Moran's I: z-value= 3.877 (p: 0.000)



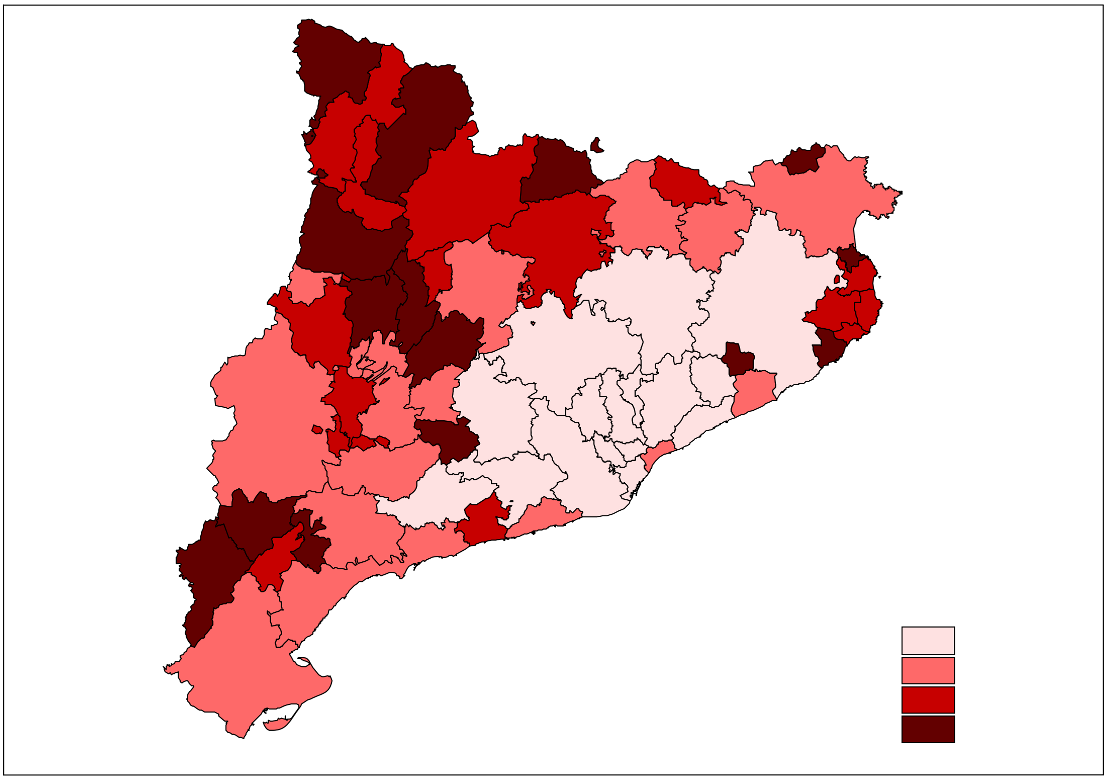
Map 10. Krugman Specialization Index, LLS, 2001

Moran's I: z-value= -0.340 (p: 0.734)



Map 11. Specialization measure (Hallet, 2000), LLS, 2001

Moran's I: z-value= 2.998 (p: 0.003)



Map 12. Li, LLS, 2001

Moran's I: z-value= 4.085 (p: 0.000)