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CONTRASTING INDICATIONS OF POLYCENTRISM WITHIN SPAIN'S METROPOLITAN URBAN REGIONS ¹

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One of the three key spatial development objectives contained within the European Spatial Development Perspective (CEE, 1999a) seeks the 'development of a polycentric and balanced urban system and strengthening of the partnership between urban and rural areas' (p.19) in order to achieve regionally balanced development.

Recent evidence arising from on-going work addressing the territorial and functional characteristics of Spain's seven principal metropolitan areas (Barcelona, Madrid, Malaga, Seville, Valencia, Bilbao and Zaragoza) within the context of the south-west European urban system, indicates significant differences in the extent to which patterns of polycentric regional development can be identified. For example with regard to labour markets and origin-destination travel flows, it is possible to detect a certain degree of polycentrism in the case of Barcelona's metropolitan area, and a similar tendency, albeit to a lesser extent, in the case of Bilbao. By contrast, in the cases of Madrid, Malaga, Seville and Valencia, what can be observed is clearly defined centralism concentrated upon the capital city of each of these areas.

This paper addresses the role of the capital cities within these seven Spanish metropolitan regions. Furthermore, it questions the extent to which there is a need for change and questions how spatial planning measures might contribute to a more balanced urban metropolitan system in Spain, taking into consideration local 'strategic planning' objectives and European spatial development policy.

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1. Introduction

The figure so often repeated and undoubtedly indelibly stamped on the minds of all those with an interest in the urban environment, is that within Europe, some 80% of the population lives within urban areas. According to Rogers (1999) in England those living in cities account for 90% of the population, with 80% living in towns of more than 1,100 inhabitants. Consequently he suggests that contemporary society is one of 'citizens' in the true meaning of the word. For Rogers, the importance of the city lies in the fact that it has a more human scale than other habitats and that it is also the place where culture develops. Nevertheless the city is in crisis due to contamination, problems of sustainability, of space and coexistence between its inhabitants.

Such problems are clearly exacerbated in the metropolitan urban regions, where the urban concentrations are highest. According to the METREX Network³, across Europe the metropolitan regions and areas face similar problems of economic change, social cohesion, urban sprawl, traffic congestion, city centre vitality and environmental damage and pollution. At the same time such areas present similar opportunities for renewal and regeneration, high quality urban life and economic competitiveness.

Rogers suggests that the post-industrial revolution can help to understand what is happening in this Europe of cities, and in order to find a solution to these urban problems, it is necessary to define a system which permits achieving a balance between humanity and the world, between humanity and nature. The METREX standpoint is similar. In view of the clear interrelationship between the aforementioned problems and opportunities of the metropolitan urban regions, the Network's *Porto Declaration* (METREX, 1999) makes a strong plea for integrated spatial planning and development at the metropolitan level, in order to strike a balance between such problems and opportunities.

It is precisely in this direction in which guidance from the European Commission has evolved over the last ten years. This evolution can be traced through a number of key documents, namely *Europe 2000*, *Europe 2000+*, *Towards an Urban Agenda in the European Union*, the *European Spatial Development Perspective (ESPD)* and *Sustainable urban development in the European Union: a framework for action* (CEE, 1991, 1994, 1997, 1999a, 1999b). The key message contained within the ESPD with regards to spatial development at a European scale and enshrined in these guidelines for the European urban system is the need to work towards achieving:

- the development of a balanced and polycentric city system and the strengthening of the partnership between urban and rural areas
- the promotion of integrated transport and communication concepts, supporting the polycentric development of the EU territory and enabling the integration into EMU
- the development and conservation of the natural and cultural heritage through wise use and management

The stance taken by organisations such as METREX, drawing together representatives from some metropolitan urban regions and its call for the need for integrated metropolitan spatial planning and development in order to resolve the potential conflict

³ METREX METREX Network of European Metropolitan Regions and Areas, which was founded in 1996, brings together politicians, officials and their advisors, with a shared interest in spatial planning and development at the metropolitan level. METREX seeks to promote the exchange of knowledge between practitioners on strategic issues of common interest, as well as to contribute the metropolitan dimension to planning at the European level. The organisation considers that it is at the metropolitan level alone at which many pressing strategic planning and development issues can effectively be addressed.

at the metropolitan scale is to be applauded. It reflects the political commitment on the part of the decision makers to collectively work towards the achievement of a more sustainable form of development and management, in the parts of the European territory where the vast majority of the population resides.

This paper sets out to examine a number of key aspects of the principal Spanish metropolitan urban regions within the context of emerging results from an INTERREG-IIC Project, involving the Spanish, Portuguese and French Governments. It compares the spatial characteristics of the metropolitan areas and then looks at a number of aspects of their internal structures, prior to addressing the issue of polycentrism vs. monocentrism at the metropolitan urban region scale. Finally some evidence is provided of recent planning policy indicating the need to work towards a more polycentric form of metropolitan spatial development.

2. The Spanish metropolitan urban regions

Work currently being carried out jointly between France, Spain and Portugal is directed towards reaching an understanding of the *south-west European urban system*. The study is being carried out at three levels of analysis - the metropolitan level, the level of the medium sized cities and what is referred to as the complementary network. In the Spanish case, at the metropolitan scale, the first phase undertaken in 1998 sought to define the functional limits of Spain's principal metropolitan agglomerations. These agglomerations were taken to be those urban systems with a central city whose population exceeded 300.000 inhabitants, and which had a metropolitan area of influence, including the central city, exceeding 500.000 inhabitants. These criteria led to the selection of Barcelona, Bilbao, Madrid, Malaga, Seville, Valencia and Zaragoza for analysis.

The methodology used to delimit these metropolitan areas involved an adaptation of the method used by the United States Bureau of Census (Office of Management and Budget, 1990), based upon flows between place of residence and place of work, using the municipality as the basic level of analysis.⁴ The resulting details (CPSV, 1998) of the seven metropolitan urban regions can be seen in Table 1.

As can be seen from the table, the metropolitan urban region of Madrid had the highest population followed by Barcelona, Valencia, Seville and Bilbao. In terms of jobs the highest number was found in Madrid, again followed by Barcelona and Valencia, but with Bilbao having a greater number of jobs than Seville. The spatial extent of the seven metropolitan areas varied considerably with Madrid being the largest followed by Seville and Barcelona. However Barcelona was the most densely populated, followed by Madrid and Bilbao. In terms of employment density Barcelona also led the seven Spanish areas, followed by Madrid, Bilbao and Valencia.

Looking at the question of economic capacity (jobs divided by population), there was a marked difference between the capacity of Barcelona (0.359), Madrid (0.319), Bilbao (0.316) and Valencia (0.308), compared with the metropolitan urban regions in the south of the Peninsula (Seville (0.240) and Malaga (0.234).

⁴ The delimiting process began by determining those municipalities from which at least 15% of the resident population's journeys to work were to the central city. This group of municipalities was treated as one area, to which outlying municipalities were added in a similar way as a second iteration, where the same 15% journey to work flow applied, repeating the process up to a fourth iteration. (CPSV, 1998)

Interestingly of the seven agglomerations studied, only with Barcelona was it possible to identify a more detailed internal structure of the Metropolitan Statistical Area, thereby enabling it to be identified as a *Consolidated Metropolitan Statistical Area (CMSA)* through the delimitation of five *Primary Metropolitan Statistical Areas (PMSAs)*.⁵ (CPSV, 1998)

<i>Metropol. urban region</i>	<i>Number of municipalities</i>	<i>Population (1996)</i>	<i>Area (km²)</i>	<i>Population density (hab/km²)</i>	<i>Jobs</i>	<i>Employment density (jobs/km²)</i>
BCN	217	4.348.272	4.592	947	1.560.393 (1996)	339,8
MAD	167	5.010.747	7.392	678	1.598.427 (1996)	216,2
MAL	26	715.252	1.654	432	167.385 (1991)	101,2
SEV	56	1.345.413	6.672	202	322.852 (1991)	48,4
VAL	86	1.467.941	2.831	519	451.623 (1991)	159,5
BIL	77	1.034.521	1.780	581	326.501 (1991)	183,4
ZAR	25	652.593	2.548	256	*	*

* information not available

Table 1: The Spanish metropolitan urban regions subject of the research

3. The Spanish metropolitan structure

The phase of the work currently being undertaken at the metropolitan level of this INTERREG-IIC project, seeks to arrive at an understanding of the territorial and functional characteristics of the Spanish metropolitan urban regions, and come to terms with the dynamics of the internal structure of each of these. A wide range of issues are being considered, including

- the physical and urban structure and forms of expansion
- demography
- economic base and employment; the presence of large centres of employment; social cohesion and/or exclusion
- accessibility; principal flows of transport, passengers and freight, and their relationship with national and international networks;
- sustainability in relation to modes of transport (public vs. private), environmental conditions and the balance with the surrounding environment or ecological footprint
- quality of life, community facilities and heritage

⁵ The PMSA's of Sabadell, Terrassa, Granollers and Mataró, as well as the residue of Barcelona. The criteria for their delimitation consisted in the same as that for the definition of the MSA: a central city with at least 50.000 inhabitants, successive aggregations according to employment relations of at least 15%, and resulting in an area with a population of at least 75.000 inhabitants.

Furthermore it seeks to ascertain the nature of the interrelationship between the seven areas and the metropolitan areas of the neighbouring European partners in the study, namely Lisbon, Oporto, Bordeaux, Toulouse and Montpellier.

3.1 Land uses within the metropolitan urban regions

An analysis of the overall land uses within the seven metropolitan areas (as contained in Table 2) highlights a number of key issues in terms of the outward expansion of the metropolitan urban regions within the wider territory. This information is based upon LANDSAT images in line with the CORINE methodology.

The most striking difference between the seven areas is that in the metropolitan urban region of Barcelona, some 12.61% of the territory is urbanised, compared with 8.28% in the cases of Madrid and 6.52% in Valencia. What can be seen is that in the metropolitan urban regions of Barcelona and Bilbao, the predominant land use is that of forest (59% in the case of Bilbao and 53% in the case of Barcelona). However in the remaining metropolitan urban regions, agriculture is the principal land use, varying from 50% in Madrid and Valencia, to almost 74% in the case of Seville.

	<i>BCN</i>	<i>MAD</i>	<i>MAL</i>	<i>SEV</i>	<i>VAL</i>	<i>BIL</i>	<i>ZAR</i>
<i>Urbanised land (high density)</i>	283.59 (6.18%)	340.06 (4.60%)	30.92 (1.87%)	150.64 (2.26%)	115.12 (4.07%)	97 (5.45%)	91.69 (3.60%)
<i>Urbanised land (low density)</i>	295.13 (6.43%)	271.9 (3.68%)	35.99 (2.18%)	49.17 (0.74%)	69.48 (2.45%)	0.88 (0.05%)	6.32 (0.25%)
<i>Agriculture</i>	1,483.81 (32.21%)	3,716.73 (50.28%)	1,142.23 (69.06%)	4,909.89 (73.59%)	1,439.02 (50.83%)	573.31 (32.21%)	1,445.74 (56.74%)
<i>Forest</i>	2,437.32 (53.08%)	2,912.67 (39.40%)	362.88 (21.94%)	970.29 (14.54%)	1,051.96 (37.16%)	1,052.03 (59.10%)	984.72 (38.65%)
<i>Water</i>	3.56 (0.08%)	51.21 (0.69%)	3.79 (0.23%)	333.74 (5.00%)	29.46 (1.04%)	9.54 (0.54%)	16.11 (0.63%)
<i>Rocky regions</i>	81.67 (1.78%)	94.69 (1.28%)	75.92 (4.59%)	242.08 (3.63%)	124.16 (4.39%)	44.72 (2.51%)	3.39 (0.13%)
<i>Mines</i>	6.88 (0.15%)	4.71 (0.06%)	2.25 (0.14%)	16.15 (0.24%)	1.69 (0.06%)	0.08 (0.00%)	0 (0.00%)
TOTAL	4,592.00	7,392.00	1,654.00	6,672.00	2,831.00	1,780.00	2,548.00

Table 2: Breakdown of land uses (km²) within the Spanish metropolitan urban regions
Source: Map of land uses pertaining to the Secretariat of State for Water and Coasts, of the Spanish Ministry of the Environment

In terms of the relationship between urbanised land of a high and low density, and the rest of the land uses, it can be seen that Barcelona is the metropolitan urban region with the highest proportion of high density urban land (6.18%), followed by Bilbao, Madrid, Valencia, Zaragoza, Seville and Malaga. However in the cases of Barcelona and Malaga, the corresponding areas of low density urbanised land are superior to that of high density (6.43% in Barcelona and 2.18% in Malaga). In the other areas the proportion of low density urbanised land is inferior to that of high density (3.68% in Madrid to 0.05% in Bilbao).

These differences can be seen clearly through a compactness indicator of the relationship between high and low density urbanised land. In the cases of Barcelona and Malaga, the proportion of high density urbanised land is inferior to that of low density. However in the other areas, the proportions are the reverse and in the case of

Bilbao to a significant extreme (110.261). In the case of Zaragoza the proportion is considerably high, in favour of the high density urbanised land.

	<i>BCN</i>	<i>MAD</i>	<i>MAL</i>	<i>SEV</i>	<i>VAL</i>	<i>BIL</i>	<i>ZAR</i>
<i>High density urbanised land</i>	0.0618	0.0460	0.0187	0.0226	0.0407	0.0545	0.0360
<i>Low density urbanised land</i>	0.0643	0.0368	0.0218	0.0074	0.0245	0.0005	0.0025
<i>Proportion between high and low densities.</i>	0.961	1.251	0.859	3.064	1.657	110.261	14.508

Table 3: Relationship between high and low density urbanised land, within the Spanish metropolitan urban regions.

Source: Map of land uses pertaining to the Secretariat of State for Water and Coasts, of the Spanish Ministry of the Environment

3.2 Mobility for employment purposes

An examination of the mobility flows between origin and destination for employment purposes similarly highlights a number of interesting results. In the case of the metropolitan urban regions, with the exception of Zaragoza for which data is not available, two basic mobility structures are apparent, relating to the destination of each municipality of residence for employment purposes.

- a) a *monocentric* structure where there is a strong single centre of attraction. This structure can be seen in the cases of Seville, Valencia and Malaga. In Madrid although there is a sub-centre, it is of little importance taking account of the elevated dependence with the central municipality
- b) a *polycentric* structure or structure of sub-centres, where there is a less strong centre of attraction and a number of sub-centres related to the principal centre of attraction. This structure is clearly visible in the case of Barcelona and Bilbao.

<i>Metropolitan urban region</i>	<i>Number of sub-centres of attraction</i>	<i>Sub-centres attracted by the central municipality <15%</i>	<i>Subcentres attracted by the central municipality >15%</i>
<i>Barcelona</i>	13	11	2
<i>Madrid</i>	11	0	11
<i>Malaga</i>	1	1	0
<i>Seville</i>	0	0	0
<i>Valencia</i>	1	1	0
<i>Bilbao</i>	4	2	2

Table 4: Sub-centres of attraction within the metropolitan urban regions

These flows of attraction are illustrated in Figures 1-6.



Figure 1: Mobility flows to centres and sub-centres of attraction within the Barcelona metropolitan urban region

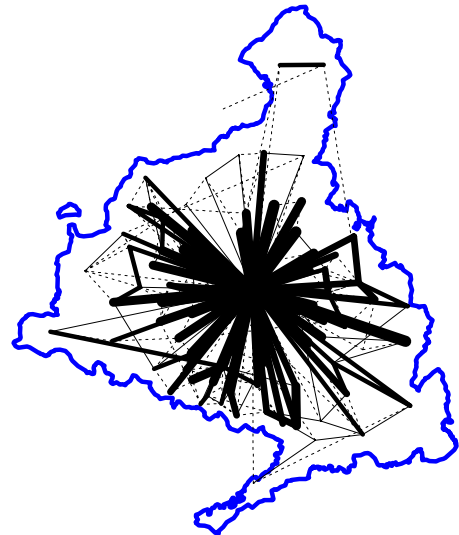


Figure 2: Mobility flows to centres and sub-centres of attraction within the Madrid metropolitan urban region



Figure 3: Mobility flows to centres and sub-centres of attraction within the Malaga metropolitan urban region



Figure 4: Mobility flows to centres and sub-centres of attraction within the Seville metropolitan urban region



Figure 5: Mobility flows to centres and sub-centres of attraction within the Valencia metropolitan urban region



Figure 6: Mobility flows to centres and sub-centres of attraction within the Bilbao metropolitan urban region

3.3 Average radial distances travelled

<i>Metropolitan urban region</i>	<i>Average radial distance (km) to the central municipality</i>	<i>Average radial distance (km) to the remaining destinations superior to 10%</i>
<i>Barcelona</i>	34.097	18.277
<i>Madrid</i>	30.348	21.179
<i>Malaga</i>	20.714	19.245
<i>Seville</i>	25.539	25.010
<i>Valencia</i>	23.904	20.927
<i>Bilbao</i>	14.939	11.618

Table 5: Average radial distances travelled within the metropolitan urban regions

Barcelona is the metropolitan urban region, which shows the most acute decrease between the distance to the central municipality and that of the principal destinations for work purposes, of almost 50%. In view of the apparently more polycentric structure, the work journeys take place directed towards centres of attraction distributed throughout the whole of the metropolitan urban region. Madrid similarly shows a significant reduction (30%), although the centres of attraction are highly dependent upon the central municipality. In the case of Bilbao, there is a reduction of about 22% with regard to the distance to the principal municipality, owing to the existence of another sub-centre of attraction. However in the cases of Seville, Malaga and Valencia, the movements are basically directed towards the principal municipality, given that there is practically no variation between the two distances and the dominance of a strictly central structure.

3.4 Out-commuting

The percentage of the occupied resident population that commutes to another municipality for employment is less than 25% for each of the six central municipalities of the six metropolitan urban regions. (See Figures 7-12) In each of the metropolitan urban regions, with the exception of Barcelona, the greatest level of out-commuting (greater than 75%) is observed in an inner ring of municipalities surrounding the central municipality. The greater the distance from the central municipality, there is a corresponding reduction in the level of out commuting. However in the case of Barcelona, owing to its more polycentric structure, this same pattern can be observed in the areas surrounding each of the sub-centres distributed throughout the Barcelona metropolitan urban region.

<i>Metropolitan urban region</i>	<i>Average out-commuting of the metropolitan urban region</i>	<i>Out-commuting from the central municipality</i>
<i>Barcelona</i>	0.61	0.21
<i>Madrid</i>	0.65	0.15
<i>Malaga</i>	0.50	0.12
<i>Seville</i>	0.56	0.12
<i>Valencia</i>	0.50	0.18
<i>Bilbao</i>	0.58	0.25

Table 6: Out-commuting for the metropolitan urban regions and the central municipalities

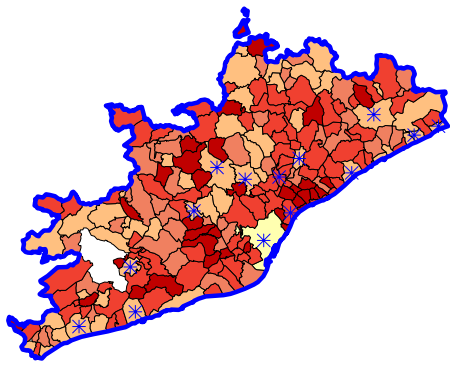


Figure 7: Out-commuting from the municipalities of the Barcelona metropolitan urban region

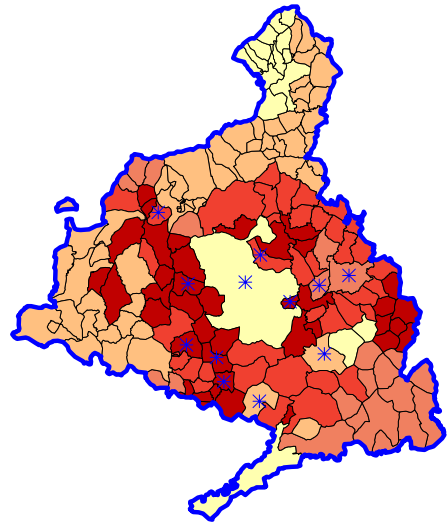


Figure 8: Out-commuting from the municipalities of the Madrid metropolitan urban region

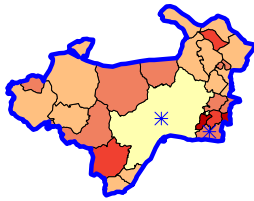


Figure 9: Out-commuting from the municipalities of the Malaga metropolitan urban region

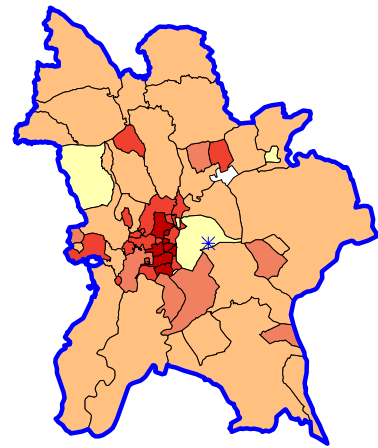


Figure 10: Out-commuting from the municipalities of the Seville metropolitan urban region

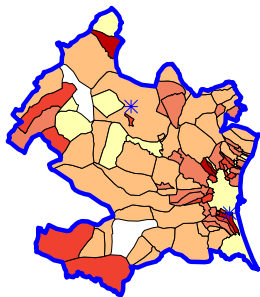


Figure 11: Out-commuting from the municipalities of the Valencia metropolitan urban region

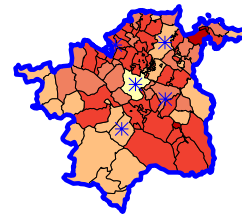


Figure 12: Out-commuting from the municipalities of the Bilbao metropolitan urban region

3.5 Labour market areas and local systems

The internal structure of each of the metropolitan urban regions has been further analysed through the elaboration of labour market areas and local systems. As a first step, homogenous labour market areas were identified, on the basis of their possessing a level of self-containment (the % of the occupied resident population who work in the same municipality) as well as self-sufficiency (% of the jobs occupied by residents of the same municipality) above a certain threshold. This threshold was originally placed at 50%, given that it is difficult to imagine a town or city unable to retain at least 50% of its working population. As a second step, these previously defined labour market areas were unified, in order to generate local systems for each of the metropolitan urban regions. These labour market areas come together as a function of the greater value of the relation, given a restriction of contiguity.

The local systems essentially represent the basic pieces (the real cities) of the metropolitan structure.

The methodology of the *labour market areas* involved the delimitation of single or pluri-municipal groups, so that they reach a degree of autonomy in the supply as much as in the demand of work, superior in the first place to 50%. Nevertheless in order to make the resulting labour market areas more comparable, in the case of Barcelona and Madrid, this threshold was reduced to 45% using 1996 data, as opposed to 1991 data for the remaining metropolitan urban regions.

The results of the characteristics of these labour market areas, total number of pluri-municipal labour market areas and the average number of municipalities per labour market area are illustrated in Table 7. These again highlight the polycentric nature of supply and demand of employment in Barcelona, and to a lesser extent in Bilbao and Valencia, which contrast with the strong monocentric nature in Madrid.

	<i>Threshold of autonomy in supply and demand of work</i>	<i>Number of pluri-municipal labour market areas</i>	<i>Average number of municipalities in the labour market areas</i>
<i>Barcelona</i>	45%	47	4.34
<i>Madrid</i>	45%	6	10.00
<i>Malaga</i>	50%	4	2.75
<i>Seville</i>	50%	5	5.40
<i>Valencia</i>	50%	15	4.27
<i>Bilbao</i>	50%	12	6.58

Table 7: Characteristics of the labour market areas within the Spanish metropolitan urban regions

Turning to the *local systems*, their elaboration carried on from the units of labour market areas, which unite from the maximum value of relation between them, until they reach a number of minimum requirements:

- a minimum population of the potential central municipality of the system of 1,000 inhabitants
- a minimum population of the final local system of 2,500 inhabitants, and
- a minimum number of municipalities of 3, except when there are two municipalities with a sufficiently high population (greater than 100,000 inhabitants).

	<i>Number of local systems</i>	<i>Average number of municipalities</i>	<i>Average number of inhabitants</i>	<i>Average area (km²)</i>
<i>Barcelona</i>	39	7.90	122,402	180
<i>Madrid</i>	11	16.27	456,572	729
<i>Malaga</i>	4	10.25	203,522	603
<i>Seville</i>	8	9.38	187,304	1,165
<i>Valencia</i>	14	10.21	117,272	482
<i>Bilbao</i>	10	9.50	108,447	217

Table 8: Characteristics of the local systems within the metropolitan urban regions

As can be seen from Table 8, Madrid, Malaga, Seville and Valencia are the four metropolitan urban regions with the largest local systems. This is due as much to the spatial extent of the initial labour market areas, as to the absence of sub-centres of attraction, distinct from the central municipality, which impede the grouping of the physically closest labour markets.

3.6 Diversity of economic activity

One of the factors that has contributed to explain the functional characteristics of the different metropolitan urban regions is the degree of diversity or specialisation of economic activity, found within each of the areas. This aspect has been approached through the use of a synthetic indicator, a Diversity Index (E_1)⁶. This index enables an assessment to be made of the diversity, or complexity, of a specific area. In order to analyse the degree of diversity of economic activity, the research has centred upon using the distribution of local workplaces at a municipality level, based upon information supplied by the Spanish Ministry of Employment (MTAS) for January 2000. The indicator has been calculated using the 53 sectors (10-74) of economic activity, CNAE-93, where the maximum value ($\ln(53)$) = 3,97029191. For reasons of comparability with Portuguese data, the sectors of agriculture, as well as public administration, were removed from the database.

The Index was applied to the municipalities of the metropolitan urban regions, to the sum of the seven metropolitan urban regions and to the whole of Spain. The results of this analysis have permitted interpreting the degree to which there exists a heterogeneity, and by implication a complexity, or homogeneity within the metropolitan territories in the context of economic activity. The values of the Index which approach the maximum value indicate a greater degree of heterogeneity and diversity, whereas the lower values indicate a low degree of diversification and a high degree of homogeneity. A territory, be it a municipality or wider metropolitan area, with a high degree of economic diversity clearly demonstrates a more balance local economy, than one with a low degree of diversity. In the latter there clearly exists a dependency upon

⁶ Diversity index (E_1):

$$E_1 = -\sum_{j=1}^J \left[\frac{X_{rj}}{X_r} \cdot \ln\left(\frac{X_{rj}}{X_r}\right) \right]$$

Varies between 0 (maximum specialisation) and logarithm of 53 (number of sectors – maximum diversity)

X_{rj} – value of the variable X in the region r and in the sector j

X_r – value of the variable X in the region r for all the sectors

a number of key sectors for employment and as a consequence a certain degree of fragility in the local economy. (See Table 9 and Figure 13)

	Diversity Index	
	Principal municipality	Metropolitan urban region
Barcelona	2,88997	3,06692
Madrid	2,80645	2,90960
Málaga	2,76551	2,72516
Sevilla	2,79119	2,82606
Valencia	2,81081	2,99702
Bilbao	2,77296	3,00810
Zaragoza	2,95025	3,01797
Total for all the areas	3,01951	
Total Spain	2,97165	

Table 9: Economic diversity index

Source: MTAS, 2000, own elaboration

Índice de diversificación económica

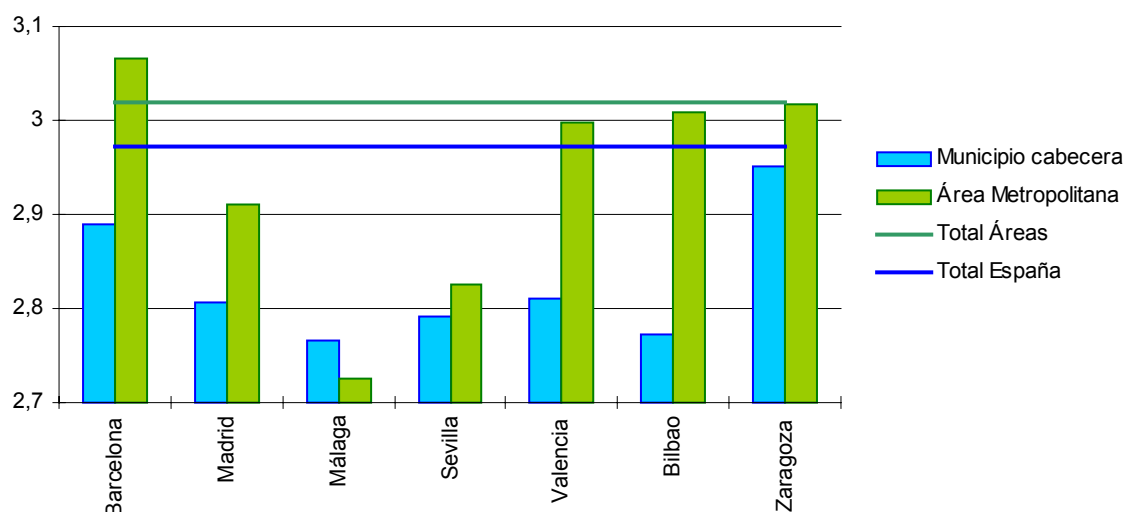


Figure 13: Economic diversity index for the Spanish metropolitan urban regions and principal municipalities (*municipio cabecera*)

It is clear that the degree of economic diversity of the seven metropolitan urban regions (3,01951) is higher than the value of the index for Spain (2,97165), and that the metropolitan urban region of Barcelona stands out as the area with the highest degree of economic diversity (3,06692), followed by Zaragoza (3,01797), Bilbao (3,00810), Valencia (2,99702), Madrid (2,90960), Sevilla (2,82606) and Málaga (2,72516). It is clearly evident that only the metropolitan urban areas of Barcelona, Zaragoza, Bilbao y Valencia indicate an economic diversity higher than that of Spain. None of the principal municipalities shows an economic diversity above that of Spain. Zaragoza has the highest degree of economic diversity (2,95025), followed by Barcelona (2,88997), Valencia (2,81081), Madrid (2,80645), Sevilla (2,79119), Bilbao (2,77296) and Málaga (2,76551).

What is plainly evident from the cartographic representation of the diversity index is the distinction between the municipalities which are able to offer employment in a wide number of economic sectors, and the municipalities where employment is concentrated in a reduced number of sectors and where there exists a certain employment dependency. In brief, a clear differentiation can be made between the areas with stronger and weaker local economies, at least from the point of view of the local employment opportunities.

4. Polycentrism vs. monocentrism

It seems clear from the foregoing evidence that the majority of Spanish metropolitan urban regions demonstrate strong monocentric characteristics with a clear focus of activity and attraction on the principal municipality in each case. These aspects cover employment mobility flows, distances travelled for employment purposes and out-commuting, the nature and extent of their constituent labour market areas and local systems, and the diversity or complexity of the economic activity contained therein.

By contrast, the metropolitan urban region of Barcelona indicates traits much more characteristic of *polycentrism*. The Barcelona metropolitan urban region is the case in which the proportion of urbanised land is significantly higher in relation to other land uses, compared with the other six metropolitan urban regions under investigation. This in itself might raise some cause for concern, in the extent to there has been an outward expansion of the urban system within the territory. However it will be recalled from section 2 that it was the only example of the previously defined *Metropolitan Statistical Areas* (CPSV, 1998) which demonstrated a more detailed internal structure. The more recent detailed analysis of its characteristics referred to here supports this conjecture of a less centrally dependent urban system, more in line with the European Commission's objectives of sustainable regional development. Nevertheless this is not to suggest that the metropolitan urban region of Barcelona represents a shining example of polycentrism and that there is no need for policy guidance or intervention. On the contrary it would seem evident that there is a need for policy guidance to consolidate and strengthen these characteristics. It is anticipated that the evolving Metropolitan Territorial Development Plan for Barcelona will address these issues.

On this very point, it is appropriate to cite the recently published *Development Plan for the Urban Agglomeration of Seville*⁷ (Junta de Andalucía, 2000). This document recognises the hitherto 'imbalance' between the centre and inner/outer rings of the metropolitan agglomeration of Seville. According to the Plan, in many aspects, the local facilities for the municipality of Seville are utilised as metropolitan facilities, in the absence of corresponding facilities elsewhere within the agglomeration. The Plan is explicit in its intent to counter the existing tendency of centralised dependence upon the municipality of Seville itself. The Plan states that:

"Public action should therefore be directed towards reducing the dependence with regard to the central city, preparing the physical support and encouraging the localisation of new activities in the metropolitan ring, so that the facilities and services of each metropolitan sector can respond to the real demand of the resident population therein." (p. 12)

⁷ This development plan covers some 22 municipalities, of the 56 municipalities constituting the metropolitan urban region of Seville for the purposes of this study.

However it is equally explicit in its pressing call for a sound and effective transport infrastructure network (public and private), in order to allow for access to and movement between different parts of the metropolitan territory, without the dependence upon the central transport network of Seville.

It is noteworthy that three of the four *Objectives* relating to *The structure of the territory* area related to these questions of correcting the dependence upon the centre and accessibility:

- Objective 1: Improving the functionality of the settlement system.*
- Objective 2: Improving of the road network of the metropolitan ring*
- Objective 3: Supporting public transport” (p. 15)*

5. Conclusions

This paper has sought to demonstrate the extent to which the Spanish system of metropolitan urban regions is on the whole monocentric. In view of the clear policy guidance from the European Commission, referred to in the *Introduction*, it is considered that there is an urgent need for some form of intervention to counter these tendencies in order to achieve a greater degree of metropolitan urban regional balance. Evidence from the south of the Iberian Peninsula is encouraging, in the content of the *Aglomeración Urbana de Sevilla, Plan de Ordenación del Territorio* (Junta de Andalucía, 2000). Nevertheless there is perhaps the need for some form of intermediary spatial planning policy guidance in Spain, in the form of the United Kingdom Department of the Environment Planning Policy Guidance Notes, between the EU guidance from Brussels and local/regional policy. It is suggested that this would contribute to make the achievement of sustainable polycentric regional development a more realistic objective.

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