FROM LOCATIONAL FUNDAMENTALS TO INCREASING RETURNS:

THE SPATIAL CONCENTRATION OF POPULATION IN SPAIN, 1787-2000

María Isabel Ayuda (*), Fernando Collantes (**) and Vicente Pinilla (**)

(University of Zaragoza)

(*) Department of Economic Analysis, Faculty of Economics and Business Studies, Calle Doctor Cerrada 1-3, 50005 Zaragoza, Spain, **mayuda@unizar.es**

(**) Department of Applied Economics and Economic History, Faculty of Economics and Business Studies, Calle Doctor Cerrada 1-3, 50005 Zaragoza, Spain, **collantf@unizar.es** , **vpinilla@unizar.es**

1. INTRODUCTION: POPULATION CONCENTRATION, LOCATIONAL FUNDAMENTALS AND THE NEW ECONOMIC GEOGRAPHY

Beginning in the early 1990s a lively literature has emerged on what we may call the "new economic geography", which has placed the spatial dimension at the centre of economic research concerns. The main theme of this school of thought is the analysis and explanation of the processes by which economic activities and population are concentrated or dispersed (Fujita, Krugman and Venables, 1999). Specifically, it has been proposed that the two phenomena are directly connected in that "agglomeration can be considered the territorial counterpart of economic growth" (Fujita and Tisse, 2002: 389).

Thus, the new economic geography links up with the existing literature on the polarised nature of economic growth, which is well represented in the classical work of scholars such as Myrdal (1957) and Hirschman (1958), orienting investigation especially towards the study of urban agglomerations, the causes for the expansion of cities, their long-run dynamics, their attractive effects on migrants, and their internal organisation and distribution (Fujita, Krugman and Venables, 1999; Henderson, Shalizi and Venables, 2001; Fujita and Tisse, 2002).

This paper is fundamentally inspired by our concern to analyse why the population is not evenly dispersed throughout the territory of a country, but rather tends to become concentrated in certain spots. The analysis of urbanisation and the dynamics of major cities is not, however, our main objective. We have sought to focus our study on the processes of population concentration-dispersion at a somewhat higher level of aggregation, which implies shifting our focus from the analysis of a strictly city-based framework to the examination of wider administrative units including not only major cities but also medium sized and small towns, as well as rural populations. This option means that population density in the units selected for analysis are not affected by the counter-urbanisation processes that have emerged with increasing strength in recent decades with the rise of peripheral towns around the great metropolises and the movement of city populations out to suburban environments. These processes therefore need to be seen as movements within a given territory, which do not change regional population location patterns, though they may change the configuration of metropolitan areas. Also, the choice of a larger sized unit allows us to cover the whole territory of a country rather than just the city or metropolitan area, which avoids the problem of selectivity bias[1].

We have opted for a long-run time frame for the analysis because the new economic geography attaches considerable importance to history as a determining factor in this kind of economic/population concentration-dispersion process, as well as stressing accumulative processes.

We are interested in discovering the extent to which industrialisation processes in Europe generated a similar population concentration-dispersion pattern to that found for economic activities (Williamson, 1965) and the size of cities. In other words, did population concentration follow an inverted-U pattern during industrialisation?

Our results show that populations within Europe have tended to become increasingly concentrated over the past two centuries without any sign yet of a trend toward dispersion similar to the processes found in the case of economic and industrial activities or in the size of cities. We believe, however, that there is an explanation for the apparent contradiction between our approach and certain findings which suggest that the growth of small and medium sized towns outstrips that of major cities after a given point, resulting in the dispersion referred to. This dispersion has materialised mainly in the already familiar phenomenon of counter-urbanisation, which implies the geographical spread of metropolitan areas[2].

A second area of concern has to do with the impact of industrialisation on the location of population on specific areas and on the pre-existing patterns of population concentration. Did industrialisation tend to create its own pattern of demographic disparities? Or did it rather reinforce the pattern of population concentration generated during the early modern period? It is clear that industrialisation profoundly changed national economies and societies, but our results echo those by De Vries (1984, pp. 160-196), who argues that European industrialisation did not create its own urban system but operated on the basis of the urban system that consolidated in the 17th century. Our results show that population concentration is today much higher than in the pre-industrial period, but present day populations tend to locate in the areas that already had the highest relative densities before industrialisation.

---

1 Other published studies also reveal a preference for the analysis of population in larger administrative units than the city or metropolitan area. See Beeson et al. (2001: 673-674), Davis and Weinstein (2002:1272), Rappaport and Sachs (2003).

2 In general, studies of this type reveal that the dispersion of industry is more important than that of population (Henderson, Shalizi and Venables, 2001, p. 96).

This leads to a third area of concern, which is the one that provides the logical structure for our econometric tests. Although industrialisation did not create its own pattern of demographic disparities across the space, it seems clear that it introduced new, specific mechanisms leading to population concentration. Briefly stated, geography can be expected to play a very important role in a pre-industrial economy (whose energetic base is organic), but increasing returns seem to be the driving force of population concentration in an industrializing economy. Are these assumptions empirically sound? Our results show that they broadly are –our explanatory matrix moves gradually from locational fundamentals to increasing returns as industrialisation unfolds.

In the pre-industrial epoch, natural factors were of enormous importance in shaping opportunities for the spatial location of populations. Thus, farm productivity was conditioned by weather and topographical factors, as well as the accessibility of markets, which may be considered good examples of the "natural" variables (first nature advantages) determining population location. We believe the apparent paradox inherent in the scant capacity of industrialising phenomena to change the patterns of population location can also be explained through some of the arguments and ideas offered by the new economic geography, in particular the emphasis placed by this research programme on the importance of cumulative processes (Krugman, 1992). The "natural" determining factors that existed before industrialisation of course continue to be important, but let us note that the historical dynamic itself has favoured cumulative processes that have also been enormously influential in conditioning the distribution of the population. As numerous studies have shown, industry not only (or even mainly) grew up in those places where comparative advantages favoured development, but also increasing returns both at the level of the firm and of the sector, as well as proximity to markets, favoured concentration from the outset once transport costs had fallen sufficiently.

Logically, this was of tremendous importance in terms of population distribution, because the activation of major migratory flows favoured an intense process of redistribution from rural to urban areas, and from the economically less dynamic regions to those enjoying modern economic growth. This would explain why industry emerged mainly in those areas with the highest population densities in every country in Europe, thus tending to reinforce the situation, while the demographically weaker areas could not provide the incentives necessary to locate new industrial activities and tended to lose demographic share in absolute or relative terms. The improvement of communications networks and falling transportation costs further favoured concentration by enhancing the relative advantage of the main urban centres over smaller towns, and of the densely over more sparsely populated regions (Thisse, 1993). Only those regions with particularly favourable resources for the location of certain types of industry could generate their own growth dynamics based on such comparative advantages.

In short, as Krugman (1993) argues, first nature advantages thus generate second nature advantages through such cumulative processes, and these are decisive in explaining the concentration of populations that has taken place both during and after the industrialisation process. It is worth pointing out here that "initial conditions" are described as accidental or fortuitous in much of the new economic geography literature, despite their considerable capacity to influence the future via cumulative processes (history). As Henderson, Shalizi and Venables (2001: 84) argue that many areas are candidates for agglomeration, and that the winners are determined by small initial differences. Krugman himself (1992: 15), discussing the location of production, refers to the long shadow that history and chance throw over population location, claiming that this is visible at every level. In his conception, history is closely linked to "historical accidents", and he argues that chance events determined the location of certain industrial activities in specific cities of the United States. In our view, however, these initial conditions were not purely accidental or the result of chance, but rather they represent what we may consider locational fundamentals whose strategic value was historically contingent and depended on the state of some basic technological and institutional variables [3].

In this way, virtuous circles of demographic growth or vicious circles of stagnation were created in the regions of every European country, and these tended to feedback into themselves with the outcome that initial location advantages became key determining factors in population location, and these processes retain considerable power to explain the situation down to the present day. The old Myrdalian concept of "circular causation" would thus play a key role in explaining how the increasing divergence of initial conditions between regions tends to reinforce population concentration (Myrdal, 1957). Hence, in the long run history itself, or path dependence,

[3] Logically, the weight of history prior to industrialisation was considerably less in the case of the United States because the country had been only recently colonised by Europeans and the influence of the native economy was minimal.

becomes increasingly important in explaining population distribution, insofar as increasing returns have favoured the concentration of economic activities (Krugman, 1991 b).

To sum up, it seems reasonable to suppose that the concentration of the European population could be explained through a combination of locational fundamentals and increasing returns. In the words of Davis and Weinstein (2002, p. 1271), we would do well "to consider a hybrid theory in which locational fundamentals play a key role in establishing the basic pattern of relative regional densities and in which increasing returns play a strong role in determining the degree of concentration".

We have chosen for our analysis the case of Spain over a period of one hundred and forty years at a time that spans from the late 18th century, a time when industrialisation had not started yet in Spain, to the present day, when Kuznetsian structural changes associated to 'modern economic growth' have been completed and new, post-industrial dynamics begin to emerge. This period compraises the beginnings of the country's industrialisation in the mid-19th century, a period of gradual development lasting almost one hundred years, intense acceleration and completion of the process in the 1960s and 1970s.

Following this introduction, the rest of this paper continues with a description of population concentration patterns on a European scale, an analysis of the Spanish case, and an econometric verification of the model we propose for it. We end with some brief conclusions.

2. MODERN ECONOMIC GROWTH AND DEMOGRAPHIC CONCENTRATION: THE EUROPEAN EXPERIENCE

The European economies have provided fundamental empirical support for the Kuznetsian account of the structural changes accompanying "modern" economic growth. This is also true for Williamson's (1965) hypothesis regarding the existence of an inverted U-shaped pattern in regional disparities in the course of the development process. In this section, we shall seek to illustrate the European pattern of spatial population distribution in order to contextualize the Spanish case.

As shown in Tables 1 and 2, the main features of the European case consist of: (1) a continuous increase in the spatial concentration of the population throughout the

19th and 20th centuries (i.e. absence of an inverted U pattern)[4]; and (2) the persistence in each country of the relative positions of the various regions in terms of demographic densities. The resulting picture is of an industrialisation process that enormously amplified regional already existing demographic disparities.

France provides the clearest example. The north-east is today the most densely populated region in the country, but this was already the case in 1800. Density in the departments of Pas-de-Calais, Bas-Rhin, Rhône, Nord and Seine Maritime, as well as the departments of the Paris area, is significantly higher than the average for the country as a whole in the present. In the departments of the Seine population density is 15 times the national average, while in Rhône and Nord it is five and four times, respectively, and so on. The densities in these departments were, however, already high in 1800. Thus, the departments of the Seine were easily three times, and Rhône and Nord twice the national average. At the other extreme, every one of the twenty least densely populated departments today were already sparsely populated in 1800. Lozère and the Alpine departments, for example, have population densities less than 20% the national average today, but even in 1800 they were not much closer (40-50% of the average). Indeed, these three were the least densely populated departments, together with Corsica, and they have remained so for the last two centuries.

Table 1. Gini coefficients: provincial-regional population densities in a selection of European countries.

	1750	1800	1850	1900	1950	1980	2000
England		0.312	0.407	0.538	0.525		
					0.527	0.485	
						0.419	0.403
France		0.192	0.243	0.316	0.393	0.454	0.463
Sweden	0.396	0.418	0.451	0.434	0.479	0.519	0.531
Switzerland			0.311	0.359	0.392	0.418	0.410
Belgium		0.216	0.303	0.325	0.350	0.360	0.359
Italy			0.241	0.233	0.223	0.261	0.271
Portugal			0.331	0.339	0.395	0.545	0.562

[4] As can be seen in Table 1, the units of analysis are broadly comparable, except for the case of Portugal and Italy, where regions have been considered instead of provinces. This must be kept in mind for comparison purposes –for instance, a downward bias might be present in the data for Italy.

Spain	0.255	0.266	0.289	0.358	0.508	0.522

England (counties): 1801, 1851, 1901, 1951, 1961, 1981 and 2001; France (departments): 1801, 1861, 1901, 1946, 1982 and 1999; Sweden (counties): 1750, 1800, 1860, 1900, 1950, 1980 and 1990; Switzerland (cantons): exact dates; Belgium (provinces): 1816, 1856, 1900, 1947, 1981, and 2003; Italy (regions): 1861, 1901, 1951, 1981 and 2001; Portugal (regions): 1878, 1900, 1950, 1981 and 1991; Spain (provinces): 1787, 1860, 1900, 1950, 1981 and 2000:

Sources: Mitchell (2003), Collantes and Pinilla (2003), www.insee.fr, www.istat.it, www.statistik.admin.ch, statbel.fgov.be, www.citypopulation.de.

Table 2. Spearman ranking correlation coefficients provincial-regional population densities.

	Reference year	Correlation coefficients with the reference year				
		1850	1900	1950	1980	2000
England	1800	0.895	0.767	0.736		
France	1850		0.915	0.853	0.762	0.727
Sweden	1850		0.924	0.881	0.877	0.870
Switzerland	1850		0.973	0.953	0.926	0.903
Belgium	1800	0.733	0.617	0.517	0.583	0.633
Italy	1900			0.668	0.700	0.662
Portugal	1850		0.991	0.958	0.914	0.911
Spain	1850		0.967	0.922	0.920	0.916

Sources: Same as Table 1.

With slight differences, a similar picture may be observed in the cases of Sweden, Switzerland and Belgium. On the periphery, Spain and Portugal reflect the two key features of the European pattern (continuous increase in demographic concentration and persistence of the relative positions before industrialisation), but the timing and pace of the process were, logically, affected by the peculiarities of industrialisation in these two countries. In both Spain and Portugal, modern economic growth in the 19th century was slow and took place in a context of divergence from the leading European states. Convergence would come in the 20th century, particularly in the period from 1950 to 1975, when both countries were able to exploit the relative advantages of backwardness, achieving spectacular growth rates, which would later slow to a more moderate pace. In this light, it is no surprise to find that the spatial concentration of the population in Spain and Portugal did not follow the French pattern of a more or less uniform increase over time, but rather grew slowly until 1950 only to shoot up over the following three decades until 1980, since when it has returned once again to a path of slow growth.

The main exceptions to the general picture are to be found in the case of England. In the first place, our analysis is confined to the 19th and 20th centuries, preventing any consideration of the spatial distribution of population of England in the 18th century. Various studies suggest, however, that the country's demographic centre of gravity from the south-east shifted toward the north-west in precisely that century, as a consequence of the influence of coal deposits on the map of early industrialisation in a technological context of high transport costs[5]. These studies thus suggest that industrialisation may have created its own demographic disparities in England, in contrast to events in France or Spain. With this exception, however, the case of England evolved to fit the common European pattern in the course of the 19th century. However, our results point to a slight but persistent decline in demographic concentration in the 20th century, above all in the second half. This would be the only case of the inverted U during industrialisation. In any event, it is possible that the small size of English counties may have an influence on the results obtained as a consequence of the increasing distance between the place of work and the place of residence (this phenomenon is much less viable at the scale of Spanish provinces or French departments).

In short, the Spanish case fits the usual European experience in which demographic concentration increases continuously throughout the period of industrialisation, reinforcing the disparities handed down from the pre-industrial epoch. The facts are briefly described in the next section.

[5] Braudel (1979), pp. 486-7; Cameron (1989), p. 223. Pollard (1997), pp. 221-54 provides a detailed analysis of the reasons why initially marginal areas may become leaders of industrialisation.

3. SPATIAL DYNAMICS OF THE SPANISH POPULATION: A LONG-RUN PERSPECTIVE

There is reasonable consensus among Spanish economic historians that the onset of industrialisation and modern economic growth should be placed around 1840/1850.[6] Industrialisation in Spain took place in the presence of already significant regional disparities. Indeed, some scholars have been at pains to stress the effects of this pre-industrial inheritance on the subsequent economic developments of the regions.[7]. These initial disparities were present not only at various economic levels, but also demographically. One of the long-run consequences of the 17th century crisis and the way in which it was overcome was to establish the leadership of the coastal regions of Spain, and particularly the Mediterranean coast, before industrialisation began. The interior of the country, which had been the heartland of the earlier Castilian splendour, was the region most deeply affected by the crisis, and demographic densities were already low in the mid-19th century. Thus, the demographic disparities between the Spanish provinces were already evident in 1860 (see Table 3), even though the main Kuznetsian structural changes had yet to take place (two thirds of the working population were employed in farming, and 80% of people lived in towns and villages with less than 5,000 inhabitants).

Table 3. Population densities and average annual population growth rates in the Spanish provinces, 1860-2000

	Population density			Growth rate	
	1860	1950	2000	1860-1950	1950-2000
Álava	32	39	95	0.2	1.8
Albacete	14	27	24	0.7	-0.2
Alicante	67	109	256	0.5	1.7
Almería	36	41	60	0.1	0.8
Asturias	51	84	102	0.6	0.4
Ávila	21	31	20	0.4	-0.9
Badajoz	19	38	30	0.8	-0.4
Baleares	55	85	180	0.5	1.5
Barcelona	94	289	617	1.3	1.5
Burgos	24	28	25	0.2	-0.2
Cáceres	15	28	20	0.7	-0.6
Cadiz	53	95	155	0.6	1.0

[6] See for example Pascual and Sudrià (2002) or Prados de la Escosura (2003), among the main recent contributions.
[7] Llopis (2001), Domínguez (2002).

Cantabria	42	77	85	0.7	0.2
Castellón	40	49	84	0.2	1.1
Ciudad Real	13	29	24	0.9	-0.4
Cordoba	26	57	56	0.9	0.0
La Coruña	71	121	141	0.6	0.3
Cuenca	13	20	12	0.4	-1.1
Gerona	53	56	98	0.1	1.1
Granada	35	62	66	0.6	0.1
Guadalajara	17	17	14	0.0	-0.4
Guipúzcoa	82	188	342	0.9	1.2
Huelva	18	36	46	0.8	0.4
Huesca	17	15	14	-0.1	-0.2
Jaén	27	57	47	0.8	-0.4
León	22	35	32	0.5	-0.2
Lérida	26	27	31	0.0	0.3
Lugo	44	52	37	0.2	-0.7
Madrid	61	241	662	1.5	2.0
Malaga	61	103	181	0.6	1.1
Murcia	34	67	103	0.8	0.9
Navarre	29	37	53	0.3	0.7
Orense	51	64	48	0.3	-0.6
Palencia	23	29	22	0.3	-0.6
Palmas (Las)	23	92	243	1.5	2.0
Pontevedra	99	150	195	0.5	0.5
Rioja (La)	35	46	53	0.3	0.3
Salamanca	21	33	29	0.5	-0.3
Santa Cruz de Tenerife	42	123	260	1.2	1.5
Segovia	21	29	21	0.4	-0.6
Seville	34	79	125	0.9	0.9
Soria	15	16	9	0.1	-1.1
Tarragona	51	57	96	0.1	1.0
Teruel	16	16	9	0.0	-1.1
Toledo	21	34	34	0.5	0.0
Valencia	57	125	207	0.9	1.0
Valladolid	30	43	62	0.4	0.8
Vizcaya	76	257	511	1.4	1.4
Zamora	24	30	19	0.3	-0.9
Zaragoza	23	36	51	0.5	0.7
Total Spain	31	55	81	0.6	0.8

Source: Collantes and Pinilla (2003), pp. 64-67.

Industrialisation did not change the geography of population concentration in terms of relative positions, as shown in Table 4 by the high correlation between provincial population densities in 1860 and provincial population densities during the following decades and up to the present day. This phenomenon is even more marked at the level of ranks than for absolute values. In short, the persistence of provinces in terms of relative levels of density is quite considerable. What industrialisation in fact did was to widen the gap between the most and least densely populated provinces through spatial disparities and the consequence formation of reservoirs of migration, in line with the disequilibrium models. Hence, industrialisation and economic development in Spain brought in train a sharp increase in the concentration of the population.

The figures reflected in table 4 provide a view of the temporal sequence of this greatly strengthened process of population concentration. Thus, we may observe the acceleration of concentration in the 1920s and 1930s, although the industrialisation process increased population concentration from the outset. It is no accident that these dates coincide with major outbreaks of interregional migration within Spain in both decades. Neither is it to be wondered at that the two decades following the Civil War saw a weakening of the concentration process. These were the 1940's and 1950's, which were marked by the Franco dictatorship's policy of economic autarky and falling per capita GDP (1935 levels would not be reached again until 1952). The extremely high economic growth rates achieved by Spain between 1960 and the onset of the 70s crisis and the sharp intensification of interregional mobility coincide with the swiftest acceleration of the population concentration process in the whole of the period. The economic slowdown and increasing share of the service sector in the Spanish economy, which by 1970 had come to represent over half of GDP, have considerably slowed the increase in population concentration.

Table 4. Concentration and dispersion indices, and temporal correlation of the population of Spanish provinces, 1787-2000

Year	Gini coefficient	Theil indice	Herfindahl indice	Spearman correlation with 1860	Raw correlation with 1860	Share of 5 largest provinces	Relative var of log pop density
1787	0.255	0.039	0.028	0.881	0.961	18.2	0.933
1860	0.266	0.040	0.028	1.000	1.000	19.0	1.000
1877	0.279	0.043	0.028	0.995	0.994	20.1	1.067
1887	0.279	0.045	0.029	0.979	0.981	20.4	1.067
1900	0.289	0.051	0.030	0.967	0.951	21.5	1.090
1910	0.292	0.053	0.031	0.954	0.938	21.9	1.191
1920	0.310	0.060	0.033	0.949	0.914	23.0	1.216
1930	0.333	0.071	0.036	0.936	0.876	25.3	1.341
1940	0.346	0.073	0.036	0.924	0.880	26.2	1.477
1950	0.358	0.081	0.038	0.922	0.858	27.8	1.592
1960	0.402	0.103	0.045	0.920	0.810	31.0	1.700
1970	0.477	0.141	0.056	0.926	0.772	36.3	2.065
1981	0.508	0.156	0.060	0.920	0.765	38.9	2.842
1991	0.520	0.155	0.059	0.912	0.764	39.4	3.381
2000	0.522	0.155	0.058	0.916	0.765	39.8	3.527

Source: : Collantes and Pinilla (2003).

It thus appears that if migratory movements were the main protagonists enabling the concentration process until the mid-20th century, travel costs imposed by the distance factor seriously constrained any regional redistribution of the population within the framework of gradual industrialisation centred on a few clearly defined hubs (mainly in the Basque Country and Catalonia)[8]. However, internal migrations rose to very high levels in the third quarter of the century, a period of spectacular economic growth and unprecedented expansion in demand for urban labour, causing the spatial concentration index to soar. As a result, numerous Spanish provinces suffered a clear loss of population, while others experienced rapid growth.

Furthermore, the concentration of the population was polarised in a relatively small number of provinces. A good example of this is the fact that the five most densely populated provinces (out of a total forty-eight), which already represented 19% of the total population of Spain in 1860, today make up almost 40% (Table 4).

Logically, such concentration has its counterpart in a significant increase in dispersion. The increment, measured as the relative variance for each year compared with 1860, is fairly gentle until 1950, but from that date on it more than doubles until 2000. Intriguingly, the rate of increase in dispersion remains high until the present day.

4. ECONOMETRIC TESTS: LOCATIONAL FUNDAMENTALS, INCREASING RETURNS AND THE CONCENTRATION OF SPANISH POPULATION

In the first place, then, we shall seek to verify empirically the importance of the natural or situational advantages acting as determining factors of demographic density in the Spanish provinces at five different moments, 1787, 1860, 1900, 1950 and 2000. The first date allows us to analyse a pre-industrial situation, the second approximately coincides with the onset of Spanish industrialisation, the next two reflect moments in the development process before the final triumph of the new economic system, and the last refers to a mature modern economy.

[8] Silvestre (2001) and (2002).

The province has been chosen as the territorial unit in the model we propose for two reasons. Firstly, the size of the provinces, though very variable, is appropriate for our objective. They are neither too big, which might permit medium distance population movements within their bounds, nor too small, which might result in a spill-over of counter-urbanisation processes beyond them[9]. Moreover, they formed the only official administrative unit, together with municipal councils, in Spain during the period between 1833 and 1977, with the advantage that all the necessary data are available.

The endogenous variable in each case is the population density of each province in the year in question, while the exogenous variables of altitude (ALT), annual rainfall (RAIN), coastal location (DCOAST) and Madrid's status as the capital city (MAD) are kept fixed in each of the four models.

Altitude has been approximated as the height of provincial capitals above sea level, and the variable provides an indication of advantages in terms of both farm production and lower transport and communication costs. Obviously, negative values are expected.

Rainfall, measured as average precipitation between 1960 and 1990 is a good indicator of agricultural potential in such dry conditions as the predominantly Mediterranean climate of the Iberian Peninsula. Given the importance of unirrigated crops, and particularly cereals, in Spanish agriculture, low rainfall would determine sharply fluctuating and low farm yields in the absence of irrigation. Hence, positive values are to be expected for this variable.

The dummy variable "coastal location" takes a value of one where the province in question has a coastline and zero if not[10]. This variable is intended to measure the contribution of proximity to the coast to productivity and quality of life. Until recent years, the first of these effects is held to be the most important, consisting above all in advantages for the maritime provinces derived from lower transport costs in gaining access to markets (Rappaport and Sachs, 2003; Fujita and Mori, 1996). In this light, a favourable relationship is also to be expected between coastal location and density.

Finally, the dummy variable MAD, which takes a value of one for the province of Madrid and zero for the rest, takes account of Madrid's uninterrupted region as the

---

9 The arithmetical mean area of the Spanish provinces is 10,359 km^2. The standard deviation is 4,702. Beeson et al. (2001: 673-674) advance similar arguments for their choice of the county to study the evolution of the US population.

capital of Spain since 1551, which has been a crucial advantage for the city's growth. A number of studies have stressed the capacity of political institutions to favour concentration. A typical example are national capitals, which benefit from political favouritism to achieve a high level of local public services and a strong transportation network, while investment in, for example, interregional transport remains meagre, penalising the competitiveness of other cities. Capitals also enjoy other benefits, such as the concentration of government institutions. This effect is accentuated in highly centralized and undemocratic countries, as was the case in Spain until 1977 (Henderson, Shalizi and Venables, 2001: 94; Davis and Henderson, 2003) [11].

Our expectation is that these variables would be significant, highlighting the importance of the locational fundamentals approach to explain the location of the Spanish population over the last two centuries.

Before calculating the proposed models, we first investigated whether the spatial distribution is random or reflects a spatial dependence model.

In order to analyze the possible presence of spatial autocorrelation in the variables, we have calculated Moran's I test and Geary's c test, the null hypothesis for which is that there is no spatial autocorrelation. The results of these statistical tests depend on the choice of the spatial weights matrix or the contact's matrix. Because of this, we have used two possible spatial weights matrices measuring spatial dependence between provinces in our analysis.

- (WK): square matrix consisting of 48 rows and 48 columns, one for each province, where each element is the inverse of the distance between provincial capitals, standardised by rows (i.e. the sum of the rows is one).
- (W): this has the same dimensions as (WK), but comprises values of 1 or 0 depending on whether provinces are adjacent or not.

Let us call:

LDEN1787: Natural logarithm of population density for each province in 1787.

LDEN1860: Natural logarithm of population density for each province in 1860.

---

[10] We also calculated the models with this variable measured as the length of coast of each province in kilometres. However, the results obtained for the measures of fit and selection criteria were worse in all cases, and because of this we have treated the DCOAST variable as a dummy variable.

[11] In highly interventionist undemocratic models, the power of bureaucrats and politicians to award licences of all kind (e.g. export-import licences or production rights) also favours national capitals. This

LDEN1900: Natural logarithm of population density for each province in 1900.

LDEN1950: Natural logarithm of population density for each province in 1950.

LDEN2000: Natural logarithm of population density for each province in 2000.

LALT: Natural logarithm of the altitude of the provincial capital.

LRAIN: Natural logarithm of average annual rainfall.

Table 5 reflects the results of Moran's I test and Geary's c test[12]:

Table 5. Moran's I test and Geary's c test applied to the variables in the model.

Variables	Moran's I		Geary's c	
	W	WK	W	WK
LDENS1787	3.9841 (0.0000)	3.8546 (0.0001)	-4.0750 (0.0000)	-4.0480 (0.0000)
LDENS1860	4.1885 (0.0000)	3.7541 (0.0002)	-3.7781 (0.0001)	-3.5394 (0.0004)
LDENS1900	3.4178 (0.0006)	2.6601 (0.0078)	-2.9790 (0.0028)	-2.1214 (0.0339)
LDENS1950	2.5656 (0.0103)	1.2814 (0.2000)	-2.3346 (0.0195)	-0.6214 (0.5343)
LDENS2000	2.7039 (0.0068)	1.7055 (0.0881)	-2.1309 (0.0331)	-0.7389 (0.4599)
LALT	5.1412 (0.0000)	5.1422 (0.0000)	-4.4495 (0.0000)	-4.3174 (0.0000)
LRAIN	5.1541 (0.0000)	7.0388 (0.0000)	-6.2816 (0.0000)	-6.7543 (0.0000)

P-values given in brackets.

Based on these data we may reject the null hypothesis of space random distribution for all variables at a level of significant of 5%, except for population density in 1950 and 2000 if the weights matrix defined as WK is used. Hence, there is clear evidence for positive spatial autocorrelation in almost all of the variables, so the values

would be the case in Spain between 1939 and 1959, when the Franco dictatorship imposed an economic policy of autarky.

[12] All of the statistical tests presented in this table, as well as the tests and estimates obtained in the following tables, have been calculated using the SpaceState programme. We have used the Normal approximation in the application of Moran's I test and Geary's c test.

taken by the variables in one province are affected by the values taken in nearby provinces.

This spatial interdependence of the variables considered needs to be taken into account in estimating the models proposed to study the importance of the situational advantages acting as determining factors of demographic density in the Spanish provinces at four different moment . Now, we shall use only the matrix we have called WK as the weights matrix, because it accounts for the distance between the province capitals and not only the bordering between them.

This spatial autocorrelation or spatial dependence may take two forms, respectively called substantive spatial dependence and spatial dependence in the error term. The first form appears when the model exhibits structural dependence, in those cases where the values taken by endogenous variable in a given province depend on the values for the same variable in adjacent provinces. The second type of spatial autocorrelation appears when dependence is exhibited in the model's residual values. The consequences of ignoring such spatial dependence, when it is fact present, depend on the type of dependence present in the model (Anselin, 1988a). If spatial autocorrelation is substantive, the OLS estimates will be biased and all inferences based on the standard regression model will be incorrect. In a sense, this is similar to the consequences of omitting a significant explanatory variable. However, the consequences of ignoring spatial dependence in the error term are the same as for heteroskedasticity: the OLS estimators remain unbiased but it is no longer efficient. Hence, any conclusions obtained on the basis of t- or F-type tests will be incorrect.

In this light, we have checked for the presence of spatial dependence using three tests: The first test is an extension of Moran's I test to measure spatial dependence in regression residual. It does not provide any guidance in terms of which the sustantive or the dependence in error term is the most likely alternative. The second one is a Lagrange Multiplier test diagnostic for a spatial lag, suggested by Anselin (1988b), LM-LAG. The final test is also a Lagrange Multiplier statistic, suggested by Burridge (1980), LM-ERR, for a spatial error case. The last two test are robust against specification errors in the dynamic structure of the equation (Anselin et al. 1996).

Since both of these two last robust tests require normality in the residual values, we have examined the normality hypothesis for each model using the Jarque-Bera test. We have also checked the null hypothesis of homoskedasticity in the various models calculated using the Breusch-Pagan test. (For a review, see Chasco, 2003).

Table 6 presents the results for each of the five years analysed (1787, 1860, 1900, 1950 and 2000).

In the models where a problem of sub-specification attributable to the omission of dynamic elements in the equation was detected using Moran's I, and the LM-ERR and LM-LAG tests, we reestimated the models with spatial autocorrelation coefficients, and the model was selected on the basis of the significance of these coefficients, as well as the Akaike's information criterion (AIC), Akaike (1981), the Schwarz´s Bayesian information criterion (SBIC), Schwarz (1978) and the value of the likelihood function (LIK).

Table 6. Estimates of population density models for the Spanish provinces, 1787-2000

Endogen	LDEN1787	LDEN1860	LDEN1900	LDEN1950	LDEN2000
C			2.1319 (0.0036)	6.7350 (0.0053)	3.4759 (0.0069)
WLDEN		0.5729 (0.0003)		-1.2416 (0.0418)	
DCOAST	0.3789 (0.0127)	0.3677 (0.0054)	0.4159 (0.0050)	0.36.4 (0.0241)	0.3601 (0.1551)
MAD	0.9524 (0.0045)	1.2036 (0.0000)	1.4825 (0.0000)	1.8689 (0.0000)	3.3048 (0.0000)
LALT	-0.0841 (0.0291)	-0.1277 (0.0003)	-0.1586 (0.0002)	-0.2225 (0.0000)	-0.3841 (0.0000)
LRAIN	0.5247 (0.0002)	0.3112 (0.0002)	0.3278 (0.0024)	0.4648 (0.0000)	0.3636 (0.0499)
Jarque-Bera	4.1636 (0.1247)		1.1567 (0.5608)		0.00040 (0.9979)
Breusch-Pagan	0.5717 (0.7513)	1.2470 (0.8703)	0.9715 (0.9141)	1.4331 (0.8384)	1.3429 (0.8540)
Nº obs.	48	48	48	48	48
R^2-corr.	0.7138	*0.7491	0.7658	*0.7870	0.7614
AIC	28.2659	24.8280	24.8567	45.4760	79.7366
SBIC	35.7507	34.1840	34.2127	56.7032	89.0926
LIK	-10.1330	-7.4140	-7.4283	-16.7380	-34.8683
MORAN'S I	1.9183 (0.0551)		1.7505 (0.0800)		0.9449 (0.3447)

LM-LAG	0.8992 (0.3429)	7.7924 (0.0052)	0.0021 (0.9638)	3.4705 (0.0624)	0.4289 (0.5125)
LM-ERR	0.0031 (0.9550)	0.3916 (0.5314)	0.1915 (0.6616)	0.4534 (0.5007)	0.1710 (0.6792)

Notes: P-values are given in brackets. WLDEN is the coefficient accompanying the spatial lag of the endogenous variable in each model.* Because of the presence of substantive spatial autocorrelation, the adjusted determination coefficient is not appropriate to measure goodness of fit, and in this case we provide the squared value of the correlation between the dependent variable and the value estimated.

All of the variables in the model are significant at a level of 5% except the dummy variable for coastal location in 2000.

These results underscore the importance of geographical factors (not to mention institutional factors in the case of the capital city, Madrid) in explaining the distribution of the Spanish population in the last two centuries[13]. All of the independent variables take the expected sign and, as a whole, they explain how the highest population densities in Spain were historically to be found in the maritime provinces, non mountainous areas and in those areas with the highest annual rainfall. Specifically, these geographical factors allowed for greater farm yields in such regions due to better weather and topographical conditions. For economic activities in general, meanwhile, proximity to the coast and location in low altitude areas implied lower transport costs and, therefore, higher productivity. The explanatory power of these models is very high, particularly in comparison to similar studies carried out in the United States for the same time horizon (Beeson et al., 2001; 682).

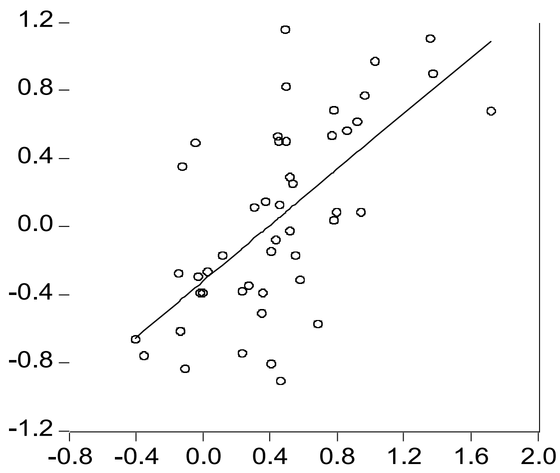
However, two important qualifications must be made. The first one concerns our results for 1787 and 1860. These results would seem to validate the hypothesis that geographical fundamentals drive population concentration in a pre-industrial economy, in the terms stated in Section 1 above. However, it must be kept in mind that data availability prevents us from testing this argument for 1500 or 1600. Historiography and some quantitative evidence suggest that the role of these geographical fundamentals was not so acute by then. For instance, the contrast between a densely populated litoral fringe and scarsely populated interior regions did not emerge clearly until the 17th century. By 1787 the share of interior regions in Spain's total population was no more than 38 per cent, but it had been 56 per cent in 1591 (Llopis, 2002, p. 124). Therefore, we do not hold that our particular set of geographical fundamentals is valid for the whole of the pre-industrial period. Rather, this set seems to be significant for an

[13] Dobado (2004) reaches a similar conclusion in a paper analysing regional inequalities in Spain.

advanced pre-industrial economy, by which we mean a pre-industrial economy in which product and factor markets are becoming more and more important. In this type of advanced pre-industrial economy, whose divergent regional economic and demographic paths have already been anaylsed for the case of Spain (Llopis, 2001, pp. 507-512; Domínguez, 2002, pp. 146-209; Pérez Moreda, 2004, pp. 131-135), litoral regions benefit substantially from lower transport costs and access to wider markets. Sadly, there is no way in which our set of geographical fundamentals can be tested for 1500 or 1600. Our guess is that some adaptations in our explanatory variables would have been required in order to obtain results as satisfactory as those found for 1787 or 1860.

Fortunately, the second qualification is one we can further elaborate in econometric terms. Our results for 1900, 1950 or 2000 seem to tell us that population concentration was driven by geographical fundamentals not only during the pre-industrial period, but also during the whole process of industrialisation. Although geography remains important for several industrial and service sectors, it is sound to suspect that our models for the 20th century are reflecting not only natural advantages, but also path-dependency. Thus, the existence of these natural advantages in the past may have generated other advantages of the kinds suggested by the new economic geography (quito la referencia a Krugman). These in themselves could be decisive in explaining the distribution and concentration of the population. As a matter of fact, a simple graphic representation of the annual growth rate of provincial population densities between 1860 and 2000 (R1860-2000) and the logarithm of relative density in each province in 1860 (LDR1860) reflects a clear positive relationship between the two variables.

Figure 1. Initial densities vs. population growth in Spanish provinces, 1860-2000



In order to discover the extent to which the initial population density may have conditioned subsequent growth, we propose a fresh model in which the dependent variable is the variation in population density for each province between two chosen dates. These are 1860-2000, 1787-1860, 1860-1900, 1900-1950 and 1950-2000. We have kept the same independent variables as in the previous models, but add initial population density for each province.

The new dependent variables are:

RC1860-2000: percentage annual rate of change in population density between 1860 and 2000 for each province.

RC1787-1860: percentage annual rate of change in population density between 1787 and 1860 for each province.

RC1860-1900: percentage annual rate of change in population density between 1860 and 1900 for each province.

RC1900-1950: percentage annual rate of change in population density between 1900 and 1950 for each province.

RC1950-2000: percentage annual rate of change in population density between 1950 and 2000 for each province.

The following Table 7 shows the Moran’s I and Geary’s c tests for spatial autocorrelation:

Table 7. Moran's I test and Geary's c test

Variables	Moran's I	Geary's c
RC1860-2000	1.3336 (0.1823)	0.1875 (0.8513)
RC1787-1860	4.7010 (0.0000)	-3.8353 (0.0000)
RC1860-1900	0.7118 (0.4766)	-0.0360 (0.9710)
RC1900-1950	0.2807 (0.7790)	0.4303 (0.6670)
RC1950-2000	3.1651 (0.0015)	-1.7991 (0.0720)

Based on these data we not reject the null hypothesis of spatial random distribution for all variables at a level of significant of 5%, except for RC1787-1860 and RC1950-2000. But, as for the explanatory variables we have rejected the null hypothesis of no spatial autocorrelation we have used the same tests for spatial autocorrelation and model selection criteria as in the previous study and we have selected the following models presented in Table 8.

Table 8. Estimates of the variation in population density models in the Spanish provinces, 1787-2000

Endogen	RC1860-2000	RC1787-1860	RC1860-1900	RC1900-1950	RC1950-2000
C		1.7894 (0.0000)	1.4386 (0.0561)	0.3443 (0.1325)	0.4382 (0.0760)
WRC					0.5357 (0.0614)
LDEN1787		-0.1561 (0.0425)			
LDEN1860	0.2599		-0.2410		

	(0.0268)		(0.1126)		
LDEN1900				0.0095 (0.0000)	
LDEN1950					0.0041 (0.0178)
DCOAST	-0.1111 (0.3749)	0.0960 (0.2128)	0.1084 (0.4801)	-0.3669 (0.0090)	0.2159 (0.3081)
MAD	1.2962 (0.0000)	0.4200 (0.0139)	1.1795 (0.0013)	0.6141 (0.0767)	1.4884 (0.0147)
LALT	-0.1318 (0.0000)	-0.0546 (0.0145)	-0.1159 (0.0099)	-0.0001 (0.4563)	-0.0011 (0.0000)
LRAIN	0.02960 (0.6979)	-0.0858 (0.1941)	0.0418 (0.7138)	0.0000 (0.6211)	-0.0004 (0.0908)
λ	0.5845 (0.0337)	0.5598 (0.0533)		0.7477 (0.0000)	
Jarque-Bera					
Breusch-Pagan	2.1861 (0.8228)	1.7656 (0.8805)	6.0307 (0.0490)	2.3241 (0.8027)	12.6948 (0.0264)
Nº obs.	48	48	48	48	48
R^2-corr.	*0.6666	*0.3187	0.2596	*0.4070	*0.6654
AIC	13.3762	-29.7423	24.9168	34.5382	79.6154
SBIC	22.7327	-18.8151	36.1440	45.7654	92.7135
LIK	-1.6884	20.8711	-6.4584	-11.2691	-32.8075
MORAN'S I			1.1571 (0.2472)		
LM-LAG	1.1754 (0.2782)	2.2525 (0.1333)	0.5955 (0.4403)	0.1215 (0.7273)	1.4995 (0.2207)
LM-ERR	1.6092 (0.2046)	1.1003 (0.2942)	0.4713 (0.4924)	3.5502 (0.0595)	0.9572 (0.3278

Notes: P-values are given in brackets. WRC is the coefficient accompanying the spatial lag of the endogenous variable in each model. _ is the spatial autocorrelation coefficient where cases of autocorrelation were detected in residual values.* Because of the presence of spatial autocorrelation, the adjusted determination coefficient is not appropriate to measure goodness of fit, and in this case we provide the squared value of the correlation between the dependent variable and the value estimated. In the two last columns the variables measuring density, rainfall and altitude have been taken at levels rather than in natural logarithms, because the selection criteria indicated that this functional form would be better for the two periods concerned.

The results validate the increasing returns approach as key to understanding the rising concentration of the Spanish population during and after the industrialisation process. Thus, between 1860 and 2000, first column, the initial density of the population is significant to explain the growth of provincial populations at 5%. This is also true of Madrid's condition as capital and altitude. The fact that rainfall is not significant could be due to the declining importance of agriculture in the Spanish economy and the fall in the farm sector's demand for labour[14]. However, it is more interesting to draw conclusions from shorter periods. The models estimated in columns 2, 3, 4 and 5 correspond to the four sub-periods into which we have divided the years from 1787 to 2000. The results show that the relationship between initial population density and subsequent population growth is highly dependent on the historical context. More specifically, this relationship was initially negative and it became positive and significant only during the 20th century. This fits with some basic facts about Spanish economic history.

For the late pre-industrial period, from 1787 to 1860, there was an inverse relationship between initial population densities and population growth. This reflects an economic context in which not only increasing returns were mainly absent (a hardly striking conclusion for a pre-industrial situation) but also one in which population concentration could act as an obstacle for further population growth. Between 1787 and 1860, Spain registered a pattern of extensive growth based on the addition of land to the agrarian production function but little growth in productivity (Llopis, 2002b). The qualitative evidence in favour of Malthusian ceilings being dangerously approached in several regions in the central part of the 19th century as elasticity of land supply began to decrease (Llopis, 2004, p. 58) fits with our result that population growth tended to be higher in those provinces with low initial population densities and bigger reserves of underexploited land.

The years between 1860 and 1900 witnessed the first stage of industrialisation in Spain. In terms of our previous discussion, this means that we could for the first time expect to find some increasing-returns logic in population concentration. However, our results do not support such an idea. Instead we find a non-significant relationship between initial densities and subsequent growth. In case we are willing to accept 85 per cent as our threshold level of significance, then the relationship would still be inverse, that is, the same situation than in the late pre-industrial period 1787-1860. Again, the reasons for such a result can be found in the features of the Spanish economy at that

[14] The decline in the general importance of natural variables to explain population growth is similar to the results obtained by Beeson et al. (2000) for the United States. In this case, the population of US counties in 1840 was the variable with the greatest explanatory power to elucidate the situation in 1990.

particular moment. True, industrialisation had begun, but the industrial structure was still dominated by consumption goods sectors (Maluquer de Motes, 2002, pp. 270-271) in which increasing returns did not play a great part. Furthermore, agriculture remained the main sector in terms of employment (around two thirds of the Spanish active population was employed in this sector both in 1860 and 1900) and still held a very considerable share (around 30 per cent in 1900, following a period-peak of 42 per cent in 1878) in national GDP (Carreras and Tafunell, 2004, p. 453; Prados de la Escosura, 2003, pp. 581-582). In such an slowly-industrialising economy, it is not surprising to find high rates of population growth in regions endowed with a potential for agrarian growth (low-altitude regions with low starting population densities, as our coefficients show).

It is only for the 20th century that we find support for the increasing-returns story. Between 1900 and 1950, the share of agriculture in employment fell from 66 to 48 per cent (Carreras and Tafunell, 2004, p. 453), the share of consumption goods in industrial production fell below 50 per cent for the first time in Spanish history (Carreras and Tafunell, 2004, p. 244) and therefore increasing returns became more significant, and internal migrations provided a major boost (Silvestre, 2001, 2002), as a result of which initial density (1900) becomes significant to explain the variation in the following fifty years. Between 1950 and 2000, a period which saw the culmination of Spanish industrialisation and intense internal migrations, initial density remains highly significant.

6. CONCLUSIONS

One of the central concerns of the new economic geography literature is the discussion surrounding the factors that determine the concentration of economic activities. In this paper, we have explored the demographic side of this story and have switched the usual scope from cities to a regional level.

In the first place, we have seen that populations in Europe have tended to become concentrated from the outset of the industrialisation process until the present day, in contrast to the situation with economic activity. The dispersion found in studies of the urban phenomenon in recent decades is compatible with our view, because this process is above all a consequence of changes in the environment of the major metropolises. From this standpoint, industrialisation would seem rather to have played the role of driver of this intense concentration process than to have radically changed population distribution patterns. Thus, the pre-industrial age emerges as the key to understanding the present-day situation, because it was then the system of cities and population distribution was fixed, while industrialisation greatly strengthened this existing order. This consistently echoes the findings by De Vries (1984, pp. 160-96) on European urbanization.

We have also examined closely the case of Spain and found that it fits well in an explanatory framework that combines locational fundamentals and increasing returns. In the line of Davis and Weinstein (2002: 1285-1286), we have found that while locational fundamentals are key to explaining general patterns of regional population distribution and the persistence of such phenomena, it would not be possible to understand the increasing concentration of the population since industrialisation or the degree of spatial differentiation of this population without the theory of increasing returns. We have proceeded as follows. In the first place, we have verified that locational fundamentals are indeed immensely important in explaining the provincial distribution of the Spanish population between 1787 and 2000. We then sought to verify the extent to which the proposed models might not hide the importance of economies of scale through cumulative processes that would tend to explain the distribution of the Spanish population. To this end, we have tried to establish whether initial density, which we have taken as an approximation to the advantages of relatively large size, might be an important factor to explain variations in population density over time. Our results confirm that initial density was indeed important in explaining relative population growth in the various provinces from 1900 onwards, when modern industry had begun to represent a significant share of the Spanish economy.

Therefore, our results support Krugman's (1991 a: 487) argument that population divergences feedback on themselves with the final result that the region concentrating population will depend to a great extent on initial conditions, even where differences between regions are originally small. In Spain, the most densely populated provinces in 1860 were not only the same in 2000, but the relative gap had widened considerably, and the initial conditions had had a major impact on the final result. Industrialisation thus sharply reinforced the concentration of the population in those places that already had relatively high densities, not only because of initial location advantages continued to favour these regions, but also because the location of industry was conditioned by factors such as proximity to markets and increasing returns (Rosés, 2003; Tirado, Paluzie and Pons, 2002). Consequently, high initial population densities generated additional advantageous conditions (second nature advantages) that favoured industrialisation, resulting in a cumulative process, which tended to further widen demographic disparities.

ACKNOWLEDGEMENTS

In the course of this research, Rafael Dobado, Alfonso Herranz and Javier Silvestre kindly provided data that greatly facilitated our quantitative work. The collaboration of Jesús Mur in the econometric treatment of the data went far beyond what is customary, for which we are sincerely grateful. We would also like to thank Luis Lanaspa for his help. We have been able to improve earlier versions of this paper thanks to the critical comments received from Antonio Aznar, Jesús Mur, José Antonio Ortega, Daniel Tirado, Javier Silvestre and the participants at the VII Congress of the Iberian Historical Demography Association, the European Association for Evolutionary Political Economy Conference 'Economics, History and Development', the XXIV Congress of the Portuguese Economic and Social History Association and seminars at the Universities Complutense of Madrid and Zaragoza. Any errors remain the responsibility of the authors.

BIBLIOGRAPHY

AKAIKE, H. (1981): "Likelihood of a model and information criteria", *Journal of Econometrics*, 16, pp. 3-14.

ANSELIN, L. (1988a): *Spatial Econometrics: Methods and Models*. Dordrecht: Kluwer.

ANSELIN, L. (1988b): Lagrrange Multiplier test diagnostic for spatial dependence and spatial heterogeneity, *Geographical Analysis*, 20, 1-17.

ANSELIN,L. BERA, A., FLORAX, R. and YOO, M. (1996): "Simple diagnostic for spatial dependence". *Regional Science and Urban Economics*, 26, pp. 77-104.

BEESON, P.E.; DEJONG, D.N. and TROESKEN, W. (2001): "Population growth in U.S. counties, 1840-1990", *Regional Science and Urban Economics*,31, pp. 669-699.

BRAUDEL, F. (1979): *Civilización material, economía y capitalismo. Siglos XV-XVIII. Tomo III. El tiempo del mundo.* Madrid, Alianza.

BURRIEDGE, P. (1980): On the Cliff-Ord test for spatial autocorrelation, *Journal of the Royal Statistical Society* B 42, 107-108.

CAMERON, R. (1989): *Historia económica mundial. Desde el paleolítico hasta el presente*. Madrid, Alianza.

CARRERAS, A. and TAFUNELL, X. (2004): *Historia económica de la España contemporánea.* Barcelona, Crítica.

CHASCO, C. (2003): *Econometría espacial aplicada aplicada a la preducción-extrapolación de datos microterritoriales.* Madrid: Dirección General de Economía y Planificación., Comunidad de Madrid.

COLLANTES, F. and PINILLA, V. (2003): "La evolución a largo plazo de la población española, 1860-2000: Tipología provincial y análisis del caso aragonés", in *Políticas Demográficas y de Población*, Zaragoza, Gobierno de Aragón, pp. 41-70.

DAVIS, D. and WEINSTEIN, D. (2002). "Bones, Bombs and Break Points: The Geography of Economic Activity", *American Economic Review*, vol. 92, n. 5, pp. 1269-1289.

DAVIS, J.C. and HENDERSON, J.V. (2003): "Evidence of the political economy of the urbanization process", *Journal of Urban Economics*, vol. 53, pp. 98-125.

DE VRIES, J. (1984): *European urbanization 1500-1800.* London, Methuen.

DOBADO, R. (2004): "Un legado peculiar: la geografía", in LLOPIS, E., ed. , *El legado económico del Antiguo Régimen en España,* Editorial Crítica, Barcelona, pp. 97-119.

DOMÍNGUEZ, R. (2002): *La riqueza de las regiones. Las desigualdades económicas regionales en España, 1700-2000.* Madrid, Alianza.

FUJITA, M. and MORI, T. (1996): "The role of ports in the making of major cities: Self-agglomeration and hub-effect", *Journal of Development Economics*, vol. 49, pp. 93-120.

FUJITA, M. and THIES, J.F. (2002): *Economics of Agglomeration.* Cambridge, Cambridge University Press.

FUJITA, M., KRUGMAN, P. and VENABLES, A.P. (1999). *The Spatial Economy*, Cambridge, Massachussets Institute of Technology.

HENDERSON, V. J.; SHALIZI, Z. and VENABLES, A. J. (2001): "Geography and Development", *Journal of Economic Geography* , no. 1, pp. 81-105.

HIRSCHMAN, A. O. (1958): *The Strategy of Economic Development.* New Haven, Yale University Press.

KIM, S. (2000): "Urban Development in the United States, 1690-1990", *Southern Economic Journal*, vol. 66 (4), pp. 855-880.

KRUGMAN, P. (1991 a): "Increasing Returns and Economic Geography", *Journal of Political Economy*, vol. 99, no. 3, pp. 483-499.

KRUGMAN, P. (1991 b): "History versus Expectations", *The Quaterly Journal of Economics*, vol. 106, no. 2, pp. 651-667.

KRUGMAN, P. (1992): *Geografía y comercio*, Barcelona, Antoni Bosch editor.

KRUGMAN, P. (1993): “First nature, second nature, and metropolitan location”, *Journal of Regional Science*, vol. 33, no. 2, pp. 129-144.

LLOPIS, E. (2001): “El legado económico del Antiguo Régimen desde la óptica regional”, in L. GERMÁN et al. (eds.), *Historia Económica regional de España. Siglos XIX y XX,* Barcelona, Crítica, pp. 507-24.

LLOPIS, E. (2002a): “Expansión, reformismo y obstáculos al crecimiento (1715-1789), in F. COMÍN, M. HERNÁNDEZ and E. LLOPIS (eds.), *Historia Económica de España, siglos X-XX*, Barcelona, Crítica, pp. 121-164.

LLOPIS, E. (2002b): “La crisis del Antiguo Régimen y la revolución liberal (1790-1840)”, in F. COMÍN, M. HERNÁNDEZ and E. LLOPIS (eds.), *Historia Económica de España, siglos X-XX*, Barcelona, Crítica, pp. 165-202.

LLOPIS, E. (2004): “España, la ‘revolución de los modernistas’ y el legado del Antiguo Régimen”, in E. LLOPIS (ed.), *El legado económico del Antiguo Régimen en España*, Barcelona, Crítica, pp. 11-76.

MALUQUER DE MOTES, J. (2002): “Crisis y recuperación económica en la Restauración (1882-1913)”, in F. COMÍN, M. HERNÁNDEZ and E. LLOPIS (eds.), *Historia Económica de España, siglos X-XX*, Barcelona, Crítica, pp. 243-284.

MEARDON, S.J. (2001): “Modeling Agglomeration and Dispersion in City and Country. Gunnar Myrdal, François Perroux and the New Economic Geography”, *American Journal of Economics and Sociology*, vol. 60,no. 1, pp. 25-57.

MITCHELL, B. R. (2003): *International Historical Statistics Europe 1750-2000.* London, Macmillan.

MYRDAL, G. (1957): *Economic Theory and Under-developed Regions*, Duckworth, London.

PALUZIE E., PONS J. and TIRADO, D. A. (2001): “Regional Integration and Specialisation Patterns in Spain”, *Regional Studies*, vol. 35.4, pp. 285-296.

PASCUAL, P. and SUDRIÀ, C. (2002) “El difícil arranque de la industrialización (1840-1880)”, in F. Comín, M. Hernández and E. Llopis (eds.), *Historia económica de España. Siglos X-XX*, Barcelona, Crítica, pp. 203-241.

PÉREZ MOREDA, V. (2004): “El legado demográfico del Antiguo Régimen”, in E. LLOPIS (ed.), *El legado económico del Antiguo Régimen en España*, Barcelona, Crítica, pp. 121-146.

POLLARD, S. (1997): *Marginal Europe. The Contribution of Marginal Lands since the Middle Ages.* Oxford, Oxford University Press.

PRADOS DE LA ESCOSURA, L. (2003): *El progreso económico de España (1850-2000).* Madrid, Fundación BBVA.

RAPPAPORT, J. and SACHS, J. (2003): “The United States as a Coastal Nation”, *Journal of Economic Growth*, vol. 8, pp. 5-46.

ROSÉS, J.R. (2003): “Why Isn’t the Whole of Spain Industrialized? New Economic Geography and Early Industrialization, 1797-1910”, *Journal of Economic History*, vol. 63. no. 4, pp. 995-1022.

SCHWARZ,C. (9178): “Estimating the dimension of a model”, *Annals of Statistics*, X, pp. 461-464.

SILVESTRE, J. (2001): “Viajes de corta distancia: una visión espacial de las migraciones interiores en España, 1877-1930”, *Revista de Historia Económica*, 19 (2), pp. 247-83.

SILVESTRE, J. (2002): “Permanent and Temporary Internal Migrations in Spain, 1877-1936. Determinants and Labour Market Impact”, *Working Paper* 02/21, University College Dublin.

THISSE, J.F. (1993): “Oligopoly and the polarization of space”, *European Economic Review*, 37, pp. 299-307.

TIRADO, D., PALUZIE, E. and PONS, J. (2002): “Economic integration and industrial location: the case of Spain before World War I”, *Journal of Economic Geography*, nº 2, pp. 343-363.

WILLIAMSON, J.G. (1965): “Regional inequality and the process of national development: a description of the patterns”, *Economic Development and Cultural Change*, vol. 13, pp. 3-45.