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Mapping foreign immigration in Spain (1998–2018). Trends and spatial patterns

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ABSTRACT

The last 20 years of sociodemographic history in Spain cannot be interpreted without considering the impact of foreign immigration, numerous publications have shown. The aim of this article is to contribute a clear spatial representation of migrants in Spain by combining statistical and mapping methods. Maps showing the rate of variation of immigrant populations point to the existence of an uneven distribution around Spain, during both the period of economic growth and the years when migratory flows waned. On the other hand, the immigrant clusters show that certain geographic areas in Spain attract specific groups; the extent of their presence can be seen on density maps based on location coefficients. In short, this article provides an understanding of foreign immigration in Spain, which other approaches have not achieved.

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Foreign immigration;
economic crisis; Spain;
foreign ratio; multivariate
analysis; location coefficient

1. Introduction

The initial signs of a new stage of migratory transition in Spain have been identified as of the late 1980s. At that moment, a long history of emigration came to an end (Pérez-Caramés et al., 2018) as positive migratory balances grew. No other EU country showed such significant growth in immigration in absolute terms during the period between 1998 and 2008 (Domínguez-Mujica & Guerra-Talavera, 2009). However, after this stage, the onset of the economic crisis gave rise to a change in the cycle, affecting not only settled migrant populations but also potential immigrants. A decrease in arrivals and an increase in people returning to their home countries (returns) or moving to other countries (remigration) ensued (López-Sala & Oso, 2015). From 2015 onwards, this trend shifted to some extent, with immigration overtaking emigration (Domínguez-Mujica et al., 2020a), although the figures have not yet reached the peak level recorded at the beginning of the twenty-first Century.

This migratory balance has played out differently according to geographic location. During the period of the economic boom (1998–2008), immigrants contributed to the revitalisation and transformation of metropolitan areas and of many rural municipalities, reversing the previous pattern of emigration. Nevertheless, during the years of the crisis and the subsequent gradual recovery (2008–2018), the figures for immigrants living in the suburban peripheries of

cities or in rural municipalities were reduced while the largest municipality concentrated higher percentages (Otero-Enríquez et al., 2019).

The result of these two decades of intense international mobility is the concentration of most immigrants in the largest cities, metropolitan areas and a large part of the Mediterranean coastal municipalities and the two Spanish archipelagos. In other words, we can see a reality made up of spaces which have been able to attract immigrants as opposed to others which have remained in the background.

This uneven distribution shows even greater heterogeneity if we consider the immigrant population by country of origin, in such a way that spaces with residents of different origins coexist, as opposed to others in which there is a clear predominance of a certain national group.

These spatial disparities are related to the pull factors at play (especially, the labour demand for low-skilled workers in the services and agriculture sectors or the prior concentration of people with the same national origin), the motives that drove certain groups to migrate (f.e. the lifestyle migrations) and other personal factors, like the particular work skills and experience that some foreign nationals bring from their country of origin. That is to say, a combination of work and residence-related flows (Parreño-Castellano & Domínguez-Mujica, 2017; Arango, 2010; Cebolla & González, 2008).

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In this context, this article has set out four specific objectives in relation to the territorial expression of immigration in Spain. Firstly, it aims to map the incidence of migratory flows from a diachronic perspective, highlighting the territorial differences between the period of strong economic growth (1998–08) and that of crisis and subsequent recovery (2008–18) (Maps A1 and A2). Next, three other objectives allow a deepening of the territorial patterns of the foreign-born population from a structural perspective (2018). To this end, the second objective is to represent the distribution of the foreign-born population at that date, using a choropleths map (Map B1). The third objective aims to show the immigration areas according to their diversity or specialisation, depending on the country of birth, for which a cluster analysis is carried out (Map B2). The last objective is to offer a mapping of the territorial location models of the same countries considered in the cluster analysis, which implies the calculation of spatial kernel densities from the location coefficients (Maps B3–B8).

2. Materials

The maps drawn up take as their geographic benchmark for territorial representation of the borders of municipalities, provinces and regions in Spain the linear information layers provided in shape format by the National Geography Institute (Zúñiga et al., 2012), which can be downloaded here: <http://centrodedescargas.cnig.es/CentroDescargas/index.jsp>.

This cartographic information has Global Reference System ETRS89 for the Iberian Peninsula, Balearic Islands, Ceuta, and Melilla and WGS84 for the Canary Islands. The latter has been placed in a box, the position of which does not reflect the real location of the islands, to accommodate it in the map design.

The statistical information was obtained from the Municipal Register, in which residents are listed, which provides a key part of the system of production of official population and migration statistics of the National Statistics Institute (INE). Its formation, maintenance, revision, and custody correspond to the respective municipalities which must submit the monthly variations that occur in municipal register data to the INE.

The INE's Continuous Register Statistic is developed based on the exhaustive use of this administrative register and provides information of the population residing in Spain on 1 January of each year according to the variables of place of residence, sex, age, nationality and place of birth available in the INEBase database (National Statistics Institute, 2020).

This source was used to gather the information needed for the creation of the maps due to the data it contained on immigrants at a municipal level,

regardless of the size of the municipality. All Spanish municipalities can be seen in maps A and B1, but only those with more than 5,000 inhabitants can be found in maps B2–B8. When working with data relative to demographic subgroups, i.e. foreign-born people by country of birth, the inclusion of municipalities under 5,000 could distort the conclusions due to the small size of some national groups in these administrative units, since it is frequent that very few people per country are included in each unit.

3. Methods

3.1. Data processing in maps A1 and A2

The information regarding the number of foreign-born inhabitants of a given municipality on 1 January of the year in question, obtained from the INE, was selected for two decades: 1998–2008 (Map A1) and 2008–2018 (Map A2). The aim was to show the changes in immigrant populations that occurred during the economic boom (1998–2008) and the crisis and period of slight recovery (2008–2018), by using two choropleth maps. Both maps depict the variation rate of foreign-born residents in each municipality in relation to those born in Spain between the initial and final year of each period. A value of 0 indicates that the ratio does not vary between the two years. A variation rate of 1 means that the ratio has doubled, while –1 means that it has been halved.

With respect to the legend we used a graduate scale, with the same intervals in both periods. Each corresponds to a range of cold colours -from light blue to dark blue- for negative rates, while positive values are shown in warm colours -from light red to dark red-, given that mapping immigrant attraction calls for a well-designed diverging colour system to facilitate the comparisons between the two maps, enabling similarities and differences to be readily seen (Brewer, 2005).

In the period analysed, 15 municipalities were affected by processes of absorption, disaggregation, and creation, so we had to standardise the data to ensure equal territorial units for the three benchmark years (1998, 2008 and 2018). As a result, the study analysed a total of 8,128 municipalities.

The result allows the perception of the transformations in the pull factors associated to the labour-market as well as the residential choices of the foreign-born inhabitants (affordable housing, child-bearing needs, migrants' networks, etc.) in the two periods under consideration.

3.2. Data processing in maps B1 to B8

The maps in block B aim to map the location of those born abroad in 2018 from different points of view.

Map B1 depicts the foreign-born population per municipality in absolute figures in a choropleth map to provide a first overview of the residential preferences of foreigners and their level of concentration in some places.

In maps B2-B8 the analysis is carried out according to the country of birth. 41% of the more than 6.3 million foreign-born residents come from the American continent, the biggest group being those from Ecuador and Colombia. The rest are divided between the European Union (28%), Africa (18%) and Asia (7.2%). Romania, the United Kingdom, Morocco, and China are the immigrants' main countries of birth. Given their quantitative size, the maps were made considering these 6 origins. The municipalities of 5,000 or more inhabitants were the only ones included for these maps, according to the reasons mentioned above.

For the B2 map a clustering was carried out, using an associative method, with the aim of achieving municipality groups with the maximum possible internal homogeneity. Previously, it had been confirmed that the variables tend to be symmetrical and there is a low level of association between them. The 15 possible Pearson's bivariate correlations have low levels of association, the highest being -0.393 . 11 of the correlations are significant with a 2-tailed level of 0.01 (Table 1).

A hierarchical cluster process was used, which enables choice of the final number of clusters according to the resultant dendrogram. The measure of relation used was the squared Euclidean distance to obtain more homogenous groups that would be easy to interpret. The method employed to establish links was the average linkage between groups. As this method considers all other previous cluster cases, it enables robust clusters to be produced.

There was an abrupt change in the incline of the clustering process from a re-scaled measure of 10. Applying this distance, 8 clusters were selected. As a result, the 1,290 municipalities were grouped together in this way (Table 2), even though 90% of the units are concentrated in 4 groups: I, V, III and II. The clusters show a high degree of homogeneousness, as seen in the variation coefficient for each variable and clusters below 1 in almost all cases. The standard deviations by clusters are like those obtained per variable.

Table 1. Bivariate Correlations in the clustering model.

	Colombia	Ecuador	Morocco	Romania	UK
China	0.339*	-0.012	-0.199*	-0.247*	-0.025
Colombia		0.026	-0.385*	-0.290*	-0.006
Ecuador			-0.117*	-0.234*	-0.191*
Morocco				-0.393*	-0.328*
Romania					-0.351*

*Correlation is significant at the 0.01 level (2-tailed).

Source: Compiled by the authors, based on data from INE, Continuous Register Statistic, 2018.

The space pattern of geographical location was carried out for each national group (B3 to B8). With this purpose, the location coefficient (LQ) for each country was calculated by municipality. The value of each Location Coefficient is given by the formula below:

$$LQ = (I / \sum(I)) / (T / \sum(T))$$

where I is the number of people born in a certain foreign country resident in a certain municipality; $\sum(I)$ is the total of foreign-born residents in a certain municipality; T is the total number of people born in a certain country that live in Spain and $\sum(T)$ is the total number of foreign-born residents in Spain.

The Location Coefficient is an indicator used to measure jointly the specialisation and the numerical importance of a specific productive activity in a particular area. When used together with geodemographic information, it enables us to measure both the weight of a certain population group in the demographic structure of the unit analysed and in comparison with the average situation of a wider area or reference point, in this case, a municipality and a country, respectively.

The representation of the Location Coefficients of each national group was carried out using the Kernel density maps calculation, to obtain simplified realities that could easily be compared. This spatial analysis tool calculates a density value for a raster image resulting from the magnitude of its coefficient and its neighbouring entities from a mathematic algorithm. In this case the search radius was not limited, and a planar approach was used at the representation stage. The result for the maps was that blotches of high intensity or 'hot spots' were created where the highest values are concentrated.

To make it possible to compare the 6 maps (B3 to B8) a common legend was established. This is somewhat complicated since the density values differ according to the country of birth. In general, where the highest values appear, the clustering of that population group is bigger. The maps have been ordered starting with groups with more dispersed models and moving on to groups that are concentrated in one area.

Table 2. Number of municipalities per cluster.

Clusters	Number of municipalities	%
I	466	36
V	317	25
III	203	16
II	168	13
VI	56	4
VII	45	3
IV	21	2
VIII	14	1
Total	1290	100

Source: Compiled by the authors, based on data from INE, Continuous Register Statistic, 2018.

4. Results

Diachronically speaking, maps A1 and A2 show stark contrasts which can be seen in the foreign-born population variation rates in the two periods under examination. The intensity in immigration arrivals in most Spanish municipalities (in red) in 1998–2008 contrasts with the losses (in blue) or the slow growth in 2008–2018. If in the first period of study, only a few municipalities in northern inland Spain showed negative variation rates, in the second period, losses are generalised and positive rates are less intense, showing the impact of the economic crisis in Spain on immigration. Furthermore, many municipalities reflect fluctuations in migration, so those which attracted the highest population then show large-scale losses and vice versa. Only the major cities stood firmer, although their increases were weak.

From a synchronic perspective, in 2018 (Map B1), the distribution of foreign-born residents in Spain can be explained by 3 main causes: (i) the uneven population concentration in cities in different demographic brackets, leading larger cities generally to have larger groups of foreign-born inhabitants (such as Madrid, Barcelona, Valencia, Seville, Zaragoza and Málaga); (ii) the fact that certain coastal municipalities specialise in tourism and in the second home market, in particular, the Mediterranean Levant (Alicante and Murcia), the Costa del Sol in Andalusia (Málaga) and the two Spanish archipelagos (The Canary and Balearic Islands, respectively) (Domínguez-Mujica et al., 2020b), and (iii) the dependence on foreign-born people in industrial and farming activity in certain smaller-sized municipalities, as in the area of Murcia and Almería in the southeast of Spain, or in Navarre in the north.

The location patterns reflected in Map B1 suggest the specialisation of certain geographic areas in receiving immigrants while also showing others that barely have any foreign-born inhabitants. The former includes municipalities that are more economically and demographically dynamic while the latter corresponds to what authors call empty, or emptied, rural Spain (Delgado Urrecho, 2018).

In the study of location of immigrants by country of origin, it became evident that there are municipalities

where various nationalities coexist, and others that reflect high numbers of a particular national group, as Morales and Echazarra demonstrated in previous research (2013). Based on this observation, multivariate cluster analysis defined 8 groups of municipalities. Map B2 shows the results from this analysis, and table 3 gives the average percentages per variable (country of birth) for the set of municipalities in each cluster.

Broadly speaking, immigration by place of origin in the bigger urban municipalities with a diverse economy, tends also to be diverse, without no one group significantly overrepresented. These municipalities are most abundant and make up cluster I.

The rest, that is 64% of municipalities, show a certain degree of specialisation by country of birth, that depends on several factors: (i) the existence of traditional migrant links or (ii) of already-established communities, (iii) the specific demand of less-skilled workers in the labour market of each municipality, (iv) how close it is to the countries of origin in question or (v) the specialisation in the attraction of life-style migrations.

Cluster V, the second largest, is a good example of the aforementioned causes. This cluster is made up by municipalities with an overrepresentation of Moroccan-born residents. This includes, firstly, municipalities in Barcelona, Gerona, Tarragona, and the Balearic Islands, which already have a history of Moroccan immigration (i). Secondly, other municipalities on the metropolitan outskirts of Madrid which already have a well-established community of Moroccan nationals (ii). Thirdly, some municipalities of Murcia, Almería, Jaén, Cáceres and Navarre, in which Moroccan nationals take up work in the agricultural sector (including irrigated crops and olive oil production) (iii); and lastly, various municipalities of Cádiz which experience incoming migratory flows due to their proximity to Morocco (iv). The incidence of these reasons adds to an underlying factor, the job opportunities in construction and farming activities where these immigrants are usually hired.

Cluster III, characterised by an overrepresentation of Romanian-born residents, includes metropolitan municipalities of Madrid, Valencia, Seville, and

Table 3. Average percentages per variable and cluster.

Cluster	China	Colombia	Ecuador	Morocco	Romania	UK
I	8	18.9	10.6	30.5	26.3	5.6
II	6.6	15.9	6.5	16.8	9.4	44.8
III	4.1	9	5.2	16.2	63	2.4
IV	4.2	10.1	3.1	14.4	36.5	31.8
V	5.1	8.9	8.8	59.7	12.6	4.9
VI	8.7	46.1	7.8	15	12.3	10
VII	5	12.5	43.2	17.8	17.5	4
VIII	33.3	19	10.8	20.7	10.5	5.7
Total	6.6	15.3	9.7	32.2	25.6	10.6

Source: Compiled by the authors, based on data from INE, Continuous Register Statistic, 2018.

Bilbao, where Romanians work in construction, the industrial sector or in the service sector. This population group can also be found in smaller municipalities where employment in the industrial and primary sector is maintained by this group, as is the case of the valley of Guadalquivir (Huelva, Seville, Córdoba), the Levant (Valencia and Castellón), of La Mancha (Toledo and Ciudad Real), the Ebro valley (Zaragoza, La Rioja) and in Valladolid in the north, to cite some representative examples.

Cluster II is characterised by an overrepresentation of UK nationals. The biggest concentration of this group is found in municipalities along the Mediterranean coast in the provinces of Alicante, Murcia, Almería, Málaga and Cádiz as well as the Balearic and Canary archipelagos, in all of which tourism is a prime activity, where many retired people have taken up residence; these are the so-called ‘lifestyle’ migrants (v). In this group, we can also find municipalities in Barcelona, La Coruña and Pontevedra. Cluster IV, with an overrepresentation of Romanians and Britons, mirrors the same regional pattern.

The remaining clusters correspond to less widespread situations. Cluster VI is characterised by high percentages of Colombians, with municipalities most common in the north-west half of the country. Cluster VII is made up of municipalities with a large Ecuadorian presence, this being most prevalent in the agricultural sector of Navarre and Murcia. Finally, cluster VIII, which has an above average percentage of Chinese-born nationals, consists only of certain municipalities where there is a high concentration of wholesale shops belonging to people from this country, something which is evident most of all on the outskirts of Madrid and Valencia.

The location of immigrants and the creation of concentrated or diversified municipal realities relates to the trend of either having concentrated or disperse national groups. For this reason, we used the location coefficients for each group of origin and their representation on the map by means of Kernel density calculation, a tool that allows us to determine the different levels of concentration per country of birth.

The results show that the areas of concentration are very low and with lower values in the cases of residents from China, Colombia and Ecuador (maps B3 to B5), and larger and with higher values for those born in Morocco, Romania and the United Kingdom (maps B6 to B8). In the latter group, a trend towards concentration can be observed. In other words, the diversification and economic integration of Chinese-born residents and the high level of labour, cultural and linguistic integration of Colombians and Ecuadorians leads these migrants to tend to live in municipalities with a diverse migratory profile. However, residents born in the UK, Morocco and Romania display lower levels of integration as they usually reside in

specific areas. The importance of life-style migration among residents born in the UK or higher constraints in the job market in the rest condition heavily concentrated geographical patterns and a trend to reside in municipalities with a more specialised migratory profile by nationality.

5. Conclusions

Normally, the migration maps represent patterns of geographical movement through the use of arrows between places (Tobler, 1987), a practice which has recently been discredited by authors who defend what is called counter-mapping (Tazzioli, 2015), by those who look for other representational processes, such as the so-called kriskograms (Xiao & Chun, 2009) or those who suggest the need for more creative cartographies of migration (van Houtum & Bueno Lacy, 2020). In our case, we have foregone flow maps and used choropleth maps, density maps and a point map for our approach to foreign immigration in Spain. The maps use population stock data in order better to understand geospatial relationships (Kraak & Ormeling, 2013) between municipalities and immigrants, focusing more on places than on people. The results of these maps show the stark differences by location that occur in the arrival of immigrants as a result of the changes in the economic situation and of the differing strength of pull factors in the Spanish municipalities analysed.

The distribution patterns of the different immigrant groups also reveal where they gather and where they do not. These locations are shaped by a combination of different factors, firstly, the productive specialisation of the municipality in question and the areas with active employment where foreign workers can become integrated; secondly, the varying tendency of each group to form part of consolidated communities, and lastly, the existence of lifestyle migration and the consequent specialisation in tourism and the housing market, which act as both a cause and effect of this type of migration.

Software

The data was processed on Microsoft Office Excel Professional Plus 2016 and IBM SPSS Statistics 26. The software used for creating the maps was ArcGis 10.5 and CorelDRAW Graphics Suite 2019, for the final design of the vectorial work.

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