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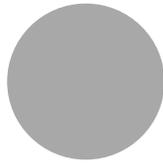
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Residential segregation and clustering dynamics of migrants in the metropolitan area of Barcelona: A demo-spatial analysis at the census tract level

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Résumé

Au cours de la première décennie du 21^{ème} siècle, la région métropolitaine de Barcelone a subi une énorme transformation démographique suite à l'arrivée de plus de 300 000 immigrants étrangers. Les schémas résidentiels résultant de l'installation des nouveaux arrivants ont considérablement modifié la composition du paysage humain à tous les niveaux territoriaux, nationaux et locaux, confrontant les décideurs et les gestionnaires des migrations à l'énorme défi de gérer la diversité démographique croissante. Dans ce contexte, deux phénomènes liés sont perçus comme particulièrement pertinents pour la cohésion sociale : (i) le degré de ségrégation résidentielle entre différents groupes de population et (ii) la concentration spatiale des nouveaux arrivants. Pour évaluer le degré et les tendances de l'assimilation spatiale des différents groupes d'immigrants et le processus de formation des aires de concentration et leur évolution dans le temps, nous combinons l'analyse de la ségrégation résidentielle au niveau métropolitain avec l'indicateur de Moran d'association spatiale au niveau local, ce qui nous permet de localiser les zones de regroupement résidentiel au niveau des secteurs de recensement. Nos résultats montrent une tendance générale vers l'assimilation spatiale des populations nées à l'étranger au niveau régional (sauf pour les Européens de l'Ouest), simultanément à la consolidation, voire l'extension, des concentrations ethniques au niveau local.

Mots-clés

Migration internationale, ségrégation résidentielle, concentration ethnique, zone métropolitaine de Barcelone.

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Abstract

During the first decade of the 21st century, the Metropolitan Region of Barcelona underwent an enormous demographic transformation following the arrival of more than 300'000 foreign immigrants. The residential patterns resulting from the settlement of the newcomers drastically changed the composition of the human landscape at all territorial levels, both national and local, confronting policy makers and migration managers with the tremendous challenge of managing the increasing population diversity. Within this context, two linked phenomena are perceived as particularly relevant for social cohesion: (i) the degree of residential segregation between different population groups and (ii) the spatial concentration of the newcomers. To assess the degree and trend of spatial assimilation of different immigrant groups and the process of formation of areas of concentration and their evolution over time, we combine the analysis of residential segregation at the metropolitan level with the application of the local indicator of spatial association (Moran's I), which allows us to locate areas of residential clustering at the census tract level. Our results show the coexistence of a general trend towards the spatial assimilation of foreign-born populations at the regional level (except for Western Europeans), along with the consolidation, and even extension, of ethnic concentrations at the local level.

Keywords

International migration, residential segregation, ethnic concentration, metropolitan area of Barcelona.

Introduction³

The turn of the new century was accompanied by a thoroughgoing transformation of the human geography of Spain, due to the incorporation of more than five million foreign immigrants between 2000 and 2010. In particular, the inflow of migrants had a major impact in the region of Catalonia and Barcelona, its capital. This single region, in which 15% of the Spanish population resides, absorbed 22% of the total inflow (1 million people), becoming one of the areas with the highest share (17.5%) of foreign-born people in Spain, surpassed only by Valencia (18.8%), Madrid (19.8%) and the island communities (Canarias: 18.8% and Baleares: 23.4%).

3. This paper has been written under the auspices of the R+D Project «Diversidad, Segregación y Vulnerabilidad, Análisis sociodemográfico» (CSO2014-54059-R – Diversity, Segregation and Vulnerability: Socio-demographic Analysis), directed by Dr. Andreu Domingo, and funded by the Spanish Ministry of Economy and Competitiveness.

In the case of the Metropolitan Area of Barcelona (MAB), this transformation can be illustrated in demographic terms and, broadly speaking, by contrasting population groups depending on their place of birth. Whereas the number of Spanish-born population decreased from 2.75 to 2.60 million between 2003 and 2013, mainly due to an intense process of suburbanization (Pujadas, 2009; López-Gay, 2014), the foreign-born group almost doubled (from 320'000 to 620'000), so that its share rose to 19.2% of the total population. In addition to its magnitude and intensity, the great diversity by country of origin (Chacón-Rodríguez, 2002), and rapid diffusion from the gateway cities (Bayona, Gil-Alonso, 2012; Sabater *et al.*, 2012) were two of the most relevant features of the inflow.

From a geo-demographic perspective, two connected phenomena are perceived as particularly relevant for social cohesion: (i) the degree of residential segregation between immigrants and natives and (ii) the spatial concentration of these new population groups. Thus, the main objectives of this study are to evaluate the degree and trend of residential segregation and to locate and monitor the formation of areas of concentration. To address these goals, we compute two different but complementary segregation indexes (Dissimilarity and Theil) between 2003 and 2013 first and the local indicator of spatial association (LISA) Moran's I second. The empirical strength of this paper derives from the Spanish population data, which allow us to follow the trends on an annual basis during a period of significant demographic and economic changes.

Review of the literature and background

Segregation and concentration of immigrant populations

The spatial differentiation of population groups is one of the key characteristics of Western cities (Hirschman, 1983). The reasons for this process may stem from free will or preferences, or it may be in response to imposition by the dominant group (Duncan, Duncan, 1955; Taeuber, Taeuber, 1965; Farley, 1977; Peach, 1996). In the particular case of major European cities, socio-economic segregation has increased during the last decade (Tammaru *et al.* 2016). With regard to the immigrant population in particular, the reasons for segregation can be grouped into three categories (Van Kempen, Özüekren; 1998):

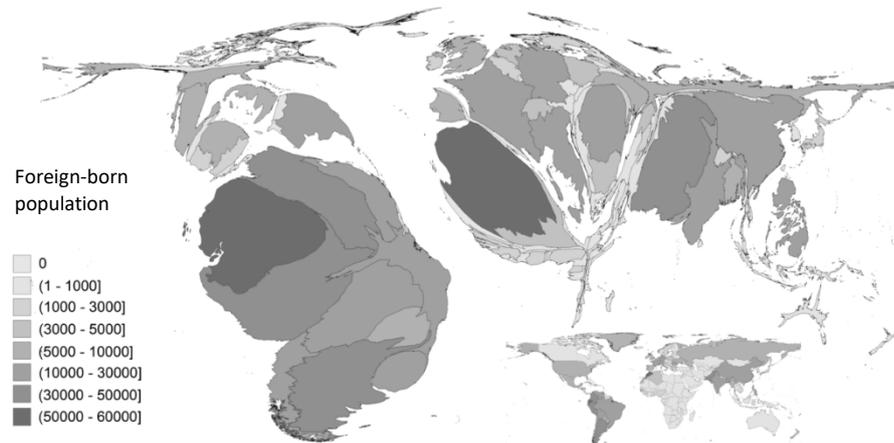
- economic reasons linked to housing prices, the position of immigrants within the labour market and the location of job opportunities;
- demographic reasons associated with processes of suburbanization and the ageing of non-migrant populations;
- reasons related to particular «ethnic motivations» for instance, the development of informal networks of mutual support.

One of the salient features of the process of spatial differentiation is the concentration of groups according to their social class and/or place of birth. Concentration increases visibility and, under certain circumstances, it can even lead to the stigmatization of an area, thereby hampering the integration of newcomers (Alba *et al.*, 1999). The so-called neighbourhood effect (van Ham *et al.*, 2012) refers to the impact of concentration on the expectations, opportunities, and living conditions of residents. When concentration is imposed, it generally occurs together with other unfavourable circumstances for the well-being of those who are submitted to this pressure. This has been studied in relation with the geographical concentration of poverty (Massey *et al.*, 1994); its pervasive consequences in terms of health inequalities (Williams, Collins, 2001) and weight status (Chang, 2006); and its inextricable relationship with school segregation (Denton, 1996), to give just a few examples.

The particular case of the Metropolitan Area of Barcelona (MAB)

The MAB has been a cosmopolitan place since the beginning of the century. In 2003, people born in 176 different countries coexisted in this high-density urban space. Eight groups had populations of over 10'000 people, but none (except for the Spanish-born group) exceeded 50'000. A decade later, the number of countries represented is almost the same (179, see Figure 1), but now there are two groups, consisting of those born in Ecuador and Morocco, with populations of over 50'000 people, and as many as nineteen groups with populations exceeding 10'000. The rapid spread of immigrants across the metropolitan region has led some scholars to refer to a process of «ethnification» of the metropolis (García-Almirall *et al.*, 2008; Miret, 2009), which is becoming increasingly visible across the whole metropolitan area with the settlement of newcomers in the different municipalities.

FIGURE 1 Cartogram of countries of birth of the immigrant population living in the Metropolitan Area of Barcelona, 2013



Source: Compiled by authors using data from the Municipal Registers, 2013 (INE). Software: ScapeToad, which uses the Gastner/Newman [2004] diffusion-based algorithm to adapt map surfaces to user-defined variables without altering their topological relations.

The degree of residential segregation migrants in the city of Barcelona, its metropolitan area, and the entire metropolitan region has been examined by several scholars during the last decade (Martori, Hoberg, 2004; Bayona, 2007; Martori, Apparicio, 2011; Bayona, López-Gay, 2011, García-Almirall *et al.*, 2008). The general picture emerging from this work is that of low and diminishing levels of segregation, with some expected heterogeneity among different foreign-born groups according to their population size, time of arrival and rates of internal mobility. The trends described have located the case of the MAB within a broader context of residential segregation in Spain (Domínguez *et al.*, 2010) and in cities of Southern Europe. It has been noted (Malheiros, 2002; Arbaci, 2008; Martínez, Leal, 2008; Maloutas *et al.*, 2012) that low levels of residential segregation should not be taken as a clear indicator of social incorporation within these cities, mainly because of certain historical features of urban evolution and the development of the welfare state in these countries. By contrast, it has been stated that housing conditions provide a clearer proxy to the social incorporation of immigrants, who were formed to increasingly live in overcrowded households and in low-quality dwellings (Arbaci, Malheiros, 2010). A significant part of this housing stock has moved to suburbs thus contributing to highly intense internal mobility of the foreign-born population and, as consequence, to its territorial diffusion and to low levels of residential segregation. While this situation has become evident for the first generation of immi-

grants, Sabater and Massey (2015) foresee the plausible increase of residential segregation *in situ*, as an expected outcome of variation in natural growth between different immigrant groups. However, it is worth noting that the dissociation between social inequality and residential segregation, which used to define the cities of southern Europe (Fujita, 2012), may be coming to an end. Leal and Sorando (2016) recently showed how increasing occupational segregation in the city of Madrid has been drawn by the widening inequality gap between the highest and lowest socio-economic classes during the last and current economic crisis in Spain.

Despite its low degree of residential segregation, the MAB has not been exempt of the formation of areas of concentration, which becomes a major concern in regard to designing and implementing integration policies (Zapata, 2001). Within the MAB, large concentrations of foreign-born population were found in the old city of the municipality of Barcelona, a gateway neighbourhood for international migration (Aramburu, 2001), and in its neighbouring municipalities (Galeano *et al.*, 2014; Sabater *et al.*, 2012; Martori, Apparicio, 2011).

This study builds on previous work in this area (Peach, 1996; Stillwell, Van Ham, 2010; Sabater *et al.*, 2012) and aims to make a significant contribution to the segregation debate by considering the process of settlement and clustering of immigrant groups in small spatial areas (census tracts) over time and space. More specifically, its goals are:

- To assess the degree of residential segregation between different foreign-born populations and natives living in the Metropolitan Area of Barcelona, as well as its trends between 2003 and 2013.
- To ascertain the extent to which the observed residential segregation at the metropolitan level is the result of the spatial distribution of natives and immigrants *within* each municipality, or of the spatial distribution *between* municipalities.
- To evaluate and monitor the formation and evolution of clustering areas, taking into account both underrepresentation and concentration of different immigrant groups at the census tract level for the whole MBA during a period of economic boom and bust.

4. Data and methodology

The Metropolitan Area of Barcelona is a territorial entity consisting of the municipality of Barcelona plus 35 other surrounding municipalities⁴. Recognized as a supra-municipal administrative entity since 2011, after the merging of three pre-existent agencies (Union of Municipalities, the Transport Authority and the Environment Authority), it extends over 636 km² and has a population, in 2013, of 3'228'569 people (four out of ten people living in Catalonia, Spain)⁵.

Data from the Municipal Register of Inhabitants (*Padrón Continuo de Población*) between 2003 and 2013 are used for analysis. The Municipal Register is the administrative register where inhabitants of the municipality are recorded, regardless of their legal status. The respective town councils are responsible for its production, maintenance, revision and custody, whereas its updating is based on the revision of the municipal register as of 1 January of each year. This is approved by the Government following a request submitted by the *Instituto Nacional de Estadística* (INE – National Statistics Institute), after a favourable report by the Registration Board. This dataset provides annual information on the basic socio-demographic characteristics (sex, age, nationality and place of birth) of the population of each municipality at the census tract level. During the years under analysis, the Municipal Register has undergone a series of methodological changes tending to address new issues related to the registration of foreign-born population. Among these changes, the most significant to do with updating expired residence permits. Since 2006, non-European migrants without a permanent residence permit (PRP) must renew their registration every two years. For European migrants and non-European migrants with a PRP, the renewal is every five years. This leads to some overestimation of the European community in our dataset, but no significant bias has been observed over the computation of residential segregation indexes for the year 2013, the first year in which the register was cleaned.

Our methodology follows two different approaches: first, we provide an overview integration of foreign-born populations at the regional level (MAB), and second, we provide a general picture of the concentration of these groups at the census tract level. Residential segregation is a multi-

4. See MAB map in Appendix 3.

5. We conducted our analysis over the MAB and not over the Metropolitan Region of Barcelona (MRG, composed by 164 municipalities) because of the compact urban and residential continuity of the MAB.

dimensional phenomenon (Massey, Denton, 1988). In this work, we focus mainly on the unevenness of the spatial distribution for different population groups by comparing it with that of the Spanish-born population. The foreign-born population is grouped by region of birth (Latin America, Western Europe⁶, Eastern Europe⁷, Africa and Asia), but we also present the results for each major sub-group by country of birth (Ecuadorians, French, Rumanians, Moroccans and Pakistanis). To assess the degree and evolution of residential segregation, we compute the index of dissimilarity (D) formulated by Duncan and Duncan (1955)⁸.

The resulting value of the index offers a synthetic estimate of the degree of spatial assimilation of immigrant populations with respect to the reference group, as well as the trend over time, but reveals nothing with regard to the specific location where segregation is occurring. To ascertain whether the observed levels of segregation for the MAB result from that taking place *within* or *between* municipalities, we use the Theil Index (H), which, because of its properties, can be additively decomposed into contributions from different geographical levels (Lichter *et al.* 2015; Farrell, 2014).

Finally, the local indicator of spatial association Moran's I (Anselin, 1995) is computed to isolate clustering areas of both concentration and/or underrepresentation of different foreign-born populations. In the cartography presented here, a threshold of statistical significance of over 95% (values above 1.96 or below -1.96) was established for clusters of concentration as well as for clusters of underrepresentation.

6. Based on the classification of the United Nations Statistics Division (2011), we define Western Europe as including: Germany, Andorra, Austria, Belgium, Denmark, Finland, France, Ireland, Island, Italy, Liechtenstein, Malta, Monaco, Norway, Netherland, Portugal United Kingdom, San Marino, Sweden, Switzerland and Vatican City.

7. Based on the classification of the United Nations Statistics Division (2011), we define Eastern Europe as including: Albania, Bulgaria, Cyprus, Hungary, Poland, Romania, Ukraine, Latvia, Moldova, Belarus, Georgia, Estonia, Lithuania, Czech Republic, Slovak Republic, Bosnia and Herzegovina, Croatia, Slovenia, Armenia, Russia, Serbia and Montenegro, and Macedonia.

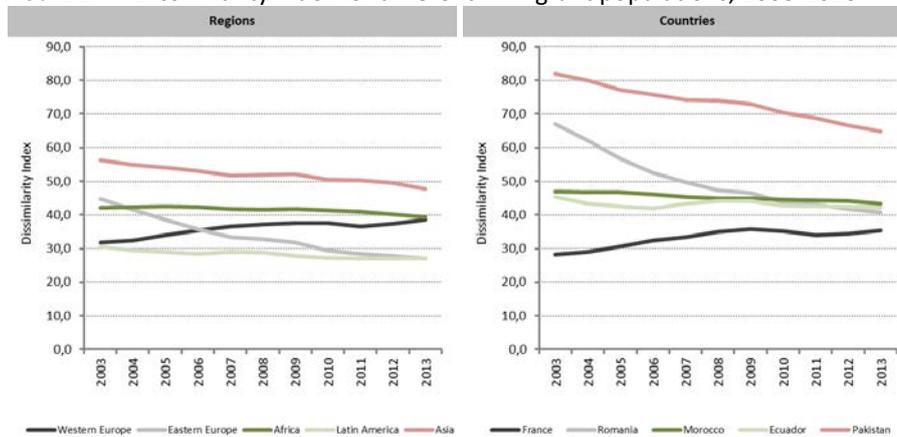
8. The formulas of the indices used for computation are included in Appendix 1.

Metropolitan spatial integration and local clustering of foreign-born populations

Residential Segregation, 2003-2013

Residential segregation can be defined as the degree to which various population groups share, or do not share, a common residential space. It is also worth noting the dual nature of this phenomenon. On the one hand, it results from a particular arrangement of a given society but, on the other, it could also be a mechanism by which inequalities, of any kind, can be perpetuated or even amplified over time (Maloutas, Fujita, 2012). One of the most widespread methods used by researchers to quantify this phenomenon has been the computation of the index of dissimilarity, which compares, at a given time, the spatial distribution of a group defined on the basis of some shared characteristic (birthplace in our case) with that of the reference group (here, the Spanish-born population). The resulting value of the index provides synthetic information as to the degree of spatial assimilation of immigrant populations, as well as the trend over time.

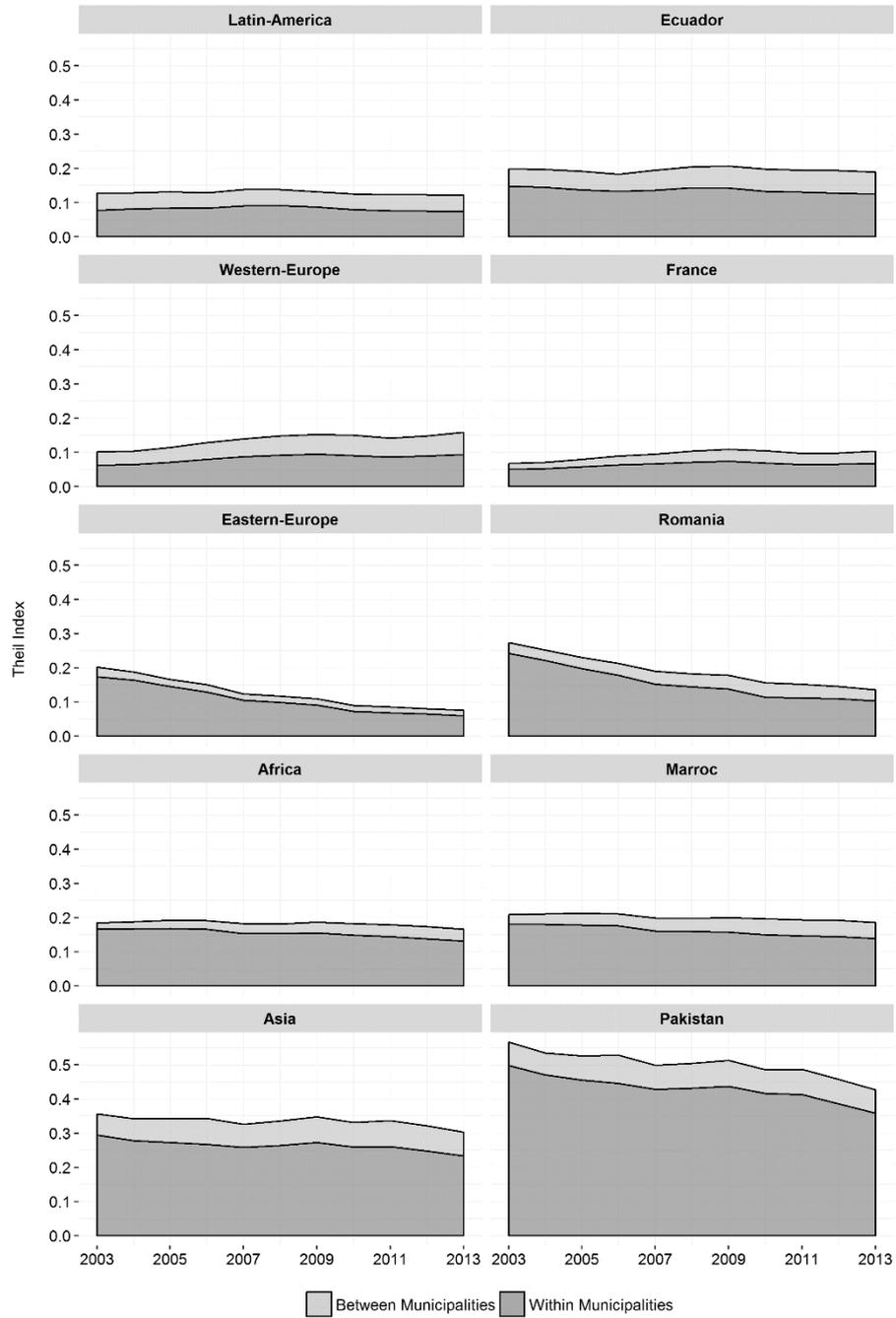
Figure 2 shows the evolution of the dissimilarity index between 2003 and 2013. Residential segregation, as measured by this index, ranges between moderate-to-low values for all groups by region of birth (below 50 points in all cases in 2013). As expected, values are higher when the index is computed over single national groups. This is particularly the case for the Pakistani and Romanian populations and, to a lesser extent, for Moroccans and Ecuadorians. The evolution also shows increasing spatial assimilation, except for the population born in countries of Western Europe (mainly French, Italians and Germans). Decreasing residential segregation over the period of 2003-2013 reflects both the demographic increase and spatial diffusion of groups under analysis and, consequently, the increase of shared residential areas with the Spanish-born population. This result is a consequence of the general balance between the degree of concentration and underrepresentation of immigrant groups in the MAB in relation with the spatial distribution of the population born in Spain.

FIGURE 2 Dissimilarity index for different immigrant populations, 2003-2013

Source: Compiled by authors using data from the Municipal Registers, 2003-2013 (INE).

The general trend, as well as the degree, is also reflected by the Theil Index (Figure 3), with Latin Americans and Eastern Europeans achieving the lowest values for residential segregation in 2013. In the case of the latter, the sharp decrease in the observed values is mainly due to the huge increase in the numbers of this population as a result of intense migratory flows following the inclusion of Romania and Bulgaria in the EU in 2007. The index also reflects the increasing residential segregation of Western Europeans as well as higher levels for Africans and, even more, Asians. However, the Theil index provides complementary information about the administrative level at which the observed metropolitan residential segregation for each group is taking place. It identifies the degree to which segregation is an outcome of the situation *within* or *between* municipalities (Table 1, annex). In qualitative terms, when residential segregation observed at the metropolitan level is mainly an outcome of the situation within municipalities, as is the case of the African or Asian population, it indicates that this population group is also spatially concentrated at the infra-municipal scale. The opposite case, in which residential segregation observed at the metropolitan level results from the situation between municipalities, would be pointing in the direction of an ethnic segmentation of the metropolitan space.

FIGURE 3 Decomposed Theil Index, MAB 2003-2013



Source: Compiled by authors using data from the Municipal Registers (INE), 2003-2013.

In the case of both Latin Americans and Western Europeans, 60% of the observed segregation is to within municipalities, and the proportion remains almost constant throughout the whole period of analysis. In the case of Eastern Europeans, Africans and Asians, the share is approximately 78% at the end of the period, and the decrease over the decade reflects, in a way, the diffusion of these populations among municipalities of the MAB and, as stated above, their higher levels of intra-municipal concentration and separation from the Spanish-born population. The greatest decrease is among Africans (from 90% to 79%), with Asians showing a smaller decrease (82% to 77%) and Eastern Europeans an intermediate situation (85% to 78%). The general decline in the weight of intra-municipal segregation over metropolitan segregation is the result of a range of trends: for Latin Americans, it is an outcome of the decrease in both components (intra-municipal and inter-municipal) of metropolitan segregation. This is also the case with Eastern Europeans, but to a considerably greater extent. However, for the African and Asian populations, it results from a mixed process: a decrease in intra-municipal segregation but an increase of inter-municipal segregation. Western Europeans show a steady increase in both areas of metropolitan segregation.

*Spatial Clustering of Immigrant Populations*⁹

To assess changes occurring in the spatial configuration of metropolitan space in relation with the composition of its population, we shall now proceed to the location of both clusters of concentration and underrepresentation of different immigrant groups at the beginning (2003) and the end of the period of analysis (2013). A concentration cluster can be defined as a place where residents share some characteristics, in our case their birthplace, and this feature comes to be overrepresented relative to its distribution within the rest of the territory of reference. In contrast, a cluster of underrepresentation is comprised of those residential areas where the same characteristic is underrepresented relative to its distribution within the rest of the territory of reference.

The local indicator of spatial association Moran's I makes it possible to locate these clusters by mapping the resulting values. A central component of this indicator, as with any general definition of a cluster, is the residential relationship established between spatial units. In this case, we define a neighbourhood matrix of 1'000 metres, complemented by a

9. See map of neighbourhoods of Barcelona municipality in the Appendix 4.

matrix using the nearest neighbour for those census tracts with no connection from the previous definition. It should also be noted that the final value of each spatial unit (here, census tracts) in this type of analysis is the result given by the ratio of the value of the index unit and the values of its neighbours. Figures 4 to 8 present the cartography resulting from the exercise of localization of clusters of concentration and underrepresentation for the years 2003 and 2013 for each immigrant group and the main sub-groups by country of birth.

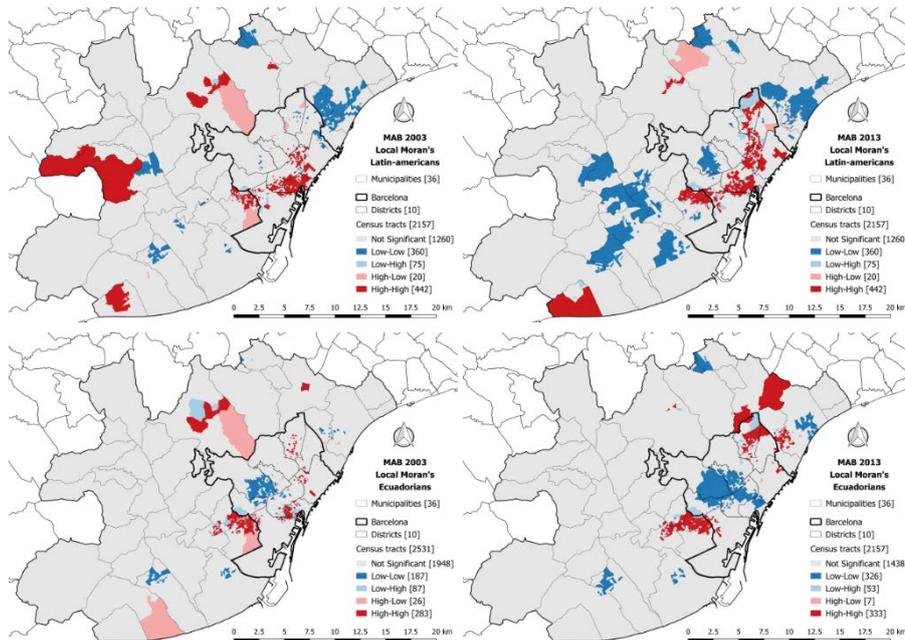
First, as expected due to the volume and intensity of the migration inflow, areas of clusters of concentration expanded between 2003 and 2013 and spread across the Metropolitan Area of Barcelona. By 2013, clusters of concentration of different groups by region of birth were found in 20 out of the 36 municipalities of the MAB. However, Barcelona is the only municipality in which the concentration areas of all population groups are located. Within Barcelona, the neighbourhoods of El Raval and the Gothic Quarter have brought together concentrations of all immigrant groups since, at least, 2003. This is a familiar situation, which has been explained in terms of both housing stock characteristics (low quality and a high tenant proportion) in these neighbourhoods and the substantial degree of ageing in the resident population. These elements have combined to turn these neighbourhoods into appealing residential spaces and the first place of settlement for the immigrant population in the first decade of this century (García-Almirall *et al.*, 2008). After Barcelona, the coastal city of Castelldefels also shows substantial concentration areas of Latin Americans, Western Europeans, Eastern Europeans and Africans, a similar situation to that of the city of Badalona, in this case with concentrations of Asians, Africans and Eastern Europeans.

Latin Americans, represented in Figure 4, are the largest immigrant group in the MAB, accounting for half of the total foreign-born population in both years (2003 and 2013), but having doubled in population from 164'000 to 320'000. Apart from the above-mentioned clusters in El Raval and the Gothic Quarter, the other great cluster of concentration of this population in 2003 was located in some city-centre neighbourhoods such as Fort Pienc. By 2013, it became possible to trace its extension along Meridiana Avenue, spreading into some of the adjacent neighbourhoods¹⁰, all of them with a below-average household income. This exercise also shows the expansion, by 2013, of the Latin American clus-

10. The neighbourhoods of El Clot, Camp de l'Arpa, Navas, La Sagrera, Congrés and Ciutat Meridiana.

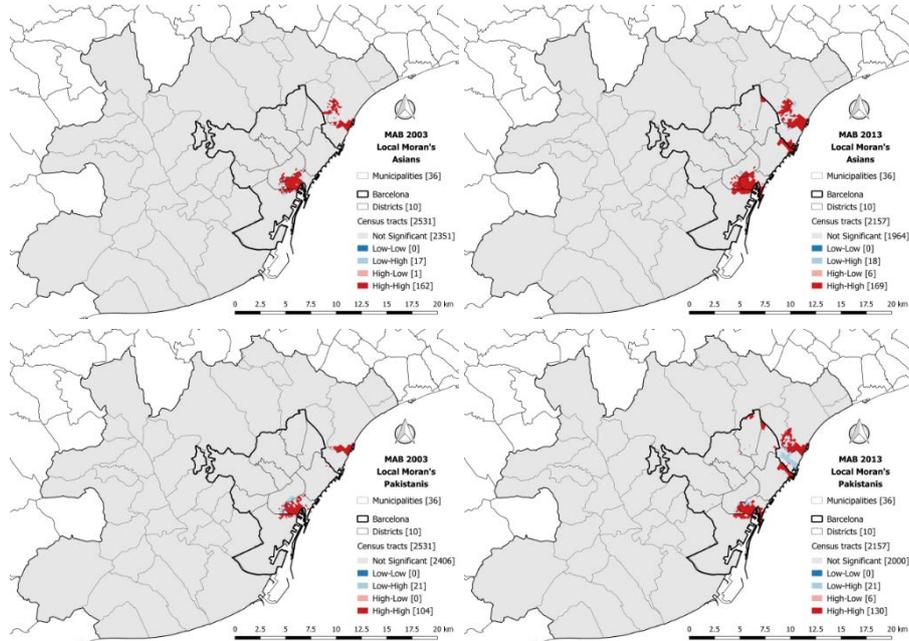
ter in the town of Castelldefels, the persistence of that located in the high-income city of Sant Cugat del Vallès and, conversely, the disappearance of cluster areas that appeared in 2003 in some peripheral municipalities characterized by a dispersed habitat, for example Cervelló. We should also note that some of the Latin American clusters show the highest degree of residential exclusivity, because the members of this group often represent more than 65% of foreigners living in those areas (67% in Sant Cugat del Vallès and L'Hospitalet de Llobregat, or up to 70% in the case of Esplugues de Llobregat) (Galeano, Bayona, 2015). As expected, Ecuadorians, the major Latin America sub-group by country of birth (in 2013 they account for 19% of the Latin American population), show a similar pattern to the whole group but with some remarkable differences; a significant underrepresentation in the city centre of Barcelona and concentration in the municipalities of Santa Coloma de Gramanet Montcada i Reixac and Cornellà de Llobregat.

FIGURE 4 Moran's I for Latin American immigrant populations, Metropolitan Area of Barcelona, 2003-2013



Source: Compiled by authors using data from the Municipal Registers (INE), 2003 and 2013.

FIGURE 5 Moran's I for Asian immigrant populations, Metropolitan Area of Barcelona, 2003-2013



Source: Compiled by authors using data from the Municipal Registers (INE), 2003 and 2013.

The second largest immigrant group in the MAB is Asians (Figure 5). This population group is even more heterogeneous than the Latin American group, mixing cultures and geographies as diverse as those of people born in China, Pakistan, Philippines, Bangladesh and India, among other countries, but with a similar socio-economic profile (immigrant workers). Clusters of concentration of this group – which, on average, between 2003 and 2013 represented 14% of the total foreign population and grew 2.61 times, from 39'585 to 103'476 people – are found, in addition to the aforementioned El Raval and Gothic Quarter neighbourhoods (where the population is mostly from Pakistan, the Philippines and Bangladesh), in the municipalities of Badalona¹¹ and Santa Coloma de Gramenet¹², where the Chinese and Pakistanis constitute the predominant foreign-born groups. The case of Asians illustrates the situation in which cluster areas become consolidated and expand after in-

11. The neighbourhoods of El Remei, Sant Roc, Artigas, La Pau, Nova Lloreda and Puigfred.

12. The neighbourhood of El Fondo.

tense population growth. In this group, old patterns of concentration are newly reproduced in the first metropolitan ring. Pakistanis (who represent 35% of the total Asian population) clearly reproduce the same pattern, with a somewhat minor territorial extension of clustering areas.

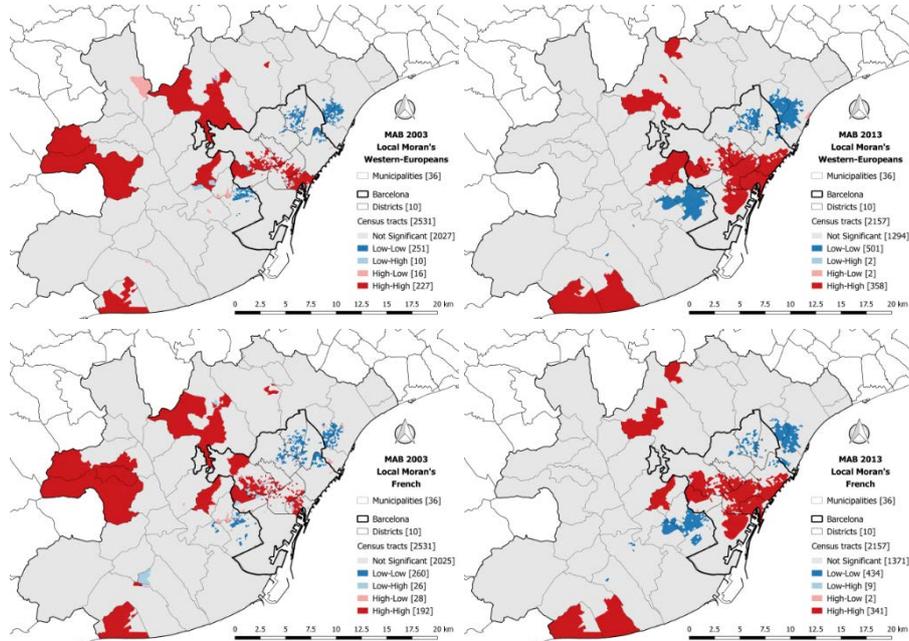
In the case of the population born in countries of Western Europe (Figure 6), population growth (from 45'859 to 81'351 between 2003 and 2013) has been accompanied by a clear territorial reconfiguration of clustering areas. Whereas in 2003, we found groups in the outlying municipalities of Castelldefels, Gavà, Cervelló, Sant Cugat del Vallès and Sant Just Desvern, as well as in the wealthy neighbourhoods of the city of Barcelona¹³ and those of the Gothic Quarter and El Raval, in 2013 the largest cluster of this population was located in the heart of the city of Barcelona¹⁴. By 2013, the clustering areas of this population had also extended across other neighbourhoods of the city¹⁵. The spatial reconfiguration of clustering areas from almost exclusively wealthy areas in 2003 to wealthy but more central neighbourhoods in 2013 responds to changes in the demographic profile of this group, with a high increase of young-adult population attracted by educational and/or occupational opportunities. Following these changes, Western Europeans have become one of the main actors in the process of population renewal, displacement and substitution, which characterize the emerging gentrification of these neighbourhoods (Hernández *et al.* 2016). In the rest of the municipalities of the MAB, another cluster has recently been found in Castelldefels and Gavà, with yet another between Esplugues de Llobregat and Sant Just Desvern, where, it might be argued, the location of the German and American schools, and the proliferation of residential complexes in the latter area encouraged the settlement of this group in these places. The distinctive socioeconomic profile of Western Europeans is reflected, in spatial terms, by the underrepresentation of members of this group in areas of high concentration of immigrant populations such as the municipalities of L'Hospitalet de Llobregat, Santa Coloma de Gramenet, Badalona and the less wealthy quarters of the north-eastern part of the municipality of Barcelona. Although the population born in France represents 27% of the total Western-European population, its pattern of spatial settlement reliably reproduces that of the group as a whole.

13. The neighbourhoods of Sant Gervasi, Les Tres Torres, Sarrià and Pedralbes.

14. The neighbourhoods of the Gothic Quarter, El Raval, Eixample, Gracia and Sant Gervasi.

15. The neighbourhoods of Barceloneta, Vila Olímpica, Poble Nou, Poble Sec and Diagonal Mar.

FIGURE 6 Moran's I for Western-European immigrant populations, Metropolitan Area of Barcelona, 2003-2013

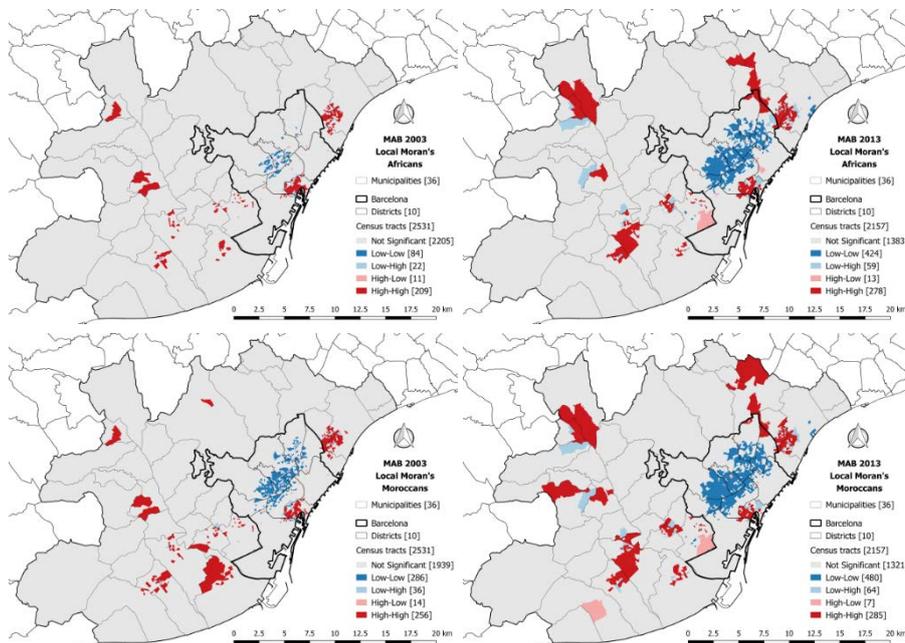


Source: Compiled by authors using data from the Municipal Registers (INE), 2003 and 2013.

The African-born population represented 15.4% (49'421 people) of the immigrant population living in the MAB in 2003 (Figure 8). Ten years later, this population had grown to 69'854, but its share among the total foreign-born population decreased to 11.3%, due to the massive increase in all other groups. Clustering areas of Africans are located in 15 different municipalities. This situation reflects the high intra-municipal concentration of this group (Figure 7). The pictures of 2003 and 2013 are quite similar, although the latter is characterized by an extension of the areas of concentration towards the low-income municipalities in the north-east Besòs area. Africans are poorly represented in the city centre and, like other immigrant groups, are concentrated in the Gothic Quarter and El Raval neighbourhood. The reasons for such underrepresentation stems not only from strict housing-market mechanisms (like prices) but also, as recently shown by Bosch *et al.* (2015), from the discriminatory practices of homeowners and real-estate agencies. In 2013, Trinidad Vella, also appears to be as a clustering area, which is not surprising given the long-established presence of the Moroccan community in that area. Elsewhere in the MAB, concentrations are located in more central

areas of the municipalities of southern Llobregat (in some cases with a significant presence of Moroccans since the early nineties, related to agriculture and industry) and in other towns close to Barcelona, for example Santa Coloma de Gramenet, Badalona and Montcada i Reixac (all of them in the Besòs area). In the case of the Moroccans (3 out of 4 Africans living in the MAB in 2013), the grouping patterns are also practically coincident with the group as a whole.

FIGURE 7 Moran's I for African immigrant populations, Metropolitan Area of Barcelona, 2003-2013

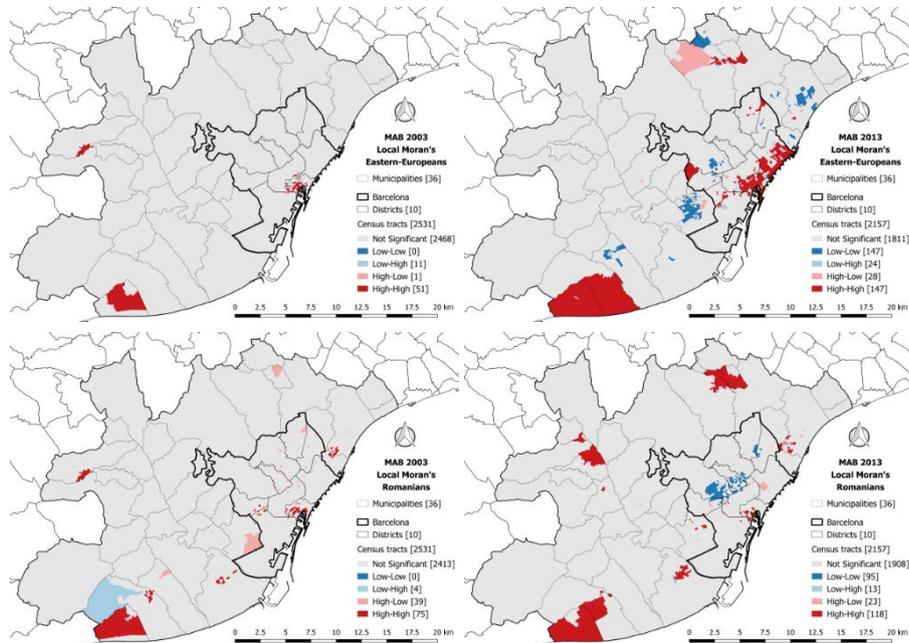


Source: Compiled by authors using data from the Municipal Registers (INE), 2003 and 2013.

Finally, the Eastern European population (Figure 8) grew from 16'902 to 52'474 between 2003 and 2013, increasing its presence in the foreign-born population from 5.3% to 8.5%. It is important to bear in mind the different socioeconomic profile of members of this group, which mainly consists of Romanians and Bulgarians – with a clear labour migrant profile – but there is also a large population born in Russia, with residential behaviour that is very similar to that of the Western European population. The population clusters of this group are found (apart from those in El Raval and the Gothic Quarter) in the coastal district of

Sant Martí¹⁶ and Ciutat Vella¹⁷. Outside Barcelona, the concentration areas are few, being located, as with the other groups, in the coastal municipalities of Castelldefels and Gavà, and in some low-income municipalities of Ripollet and Cerdanyola del Vallès. For Romanians, and unlike the whole Eastern-European group, the concentration areas are smaller, with a greater presence in peripheral municipalities and the lack of concentration areas in the maritime facade of the city, where concentration areas reflect the settlement pattern of the Russian population.

FIGURE 8 Moran's I for Eastern-European immigrant populations, Metropolitan Area of Barcelona, 2003-2013



Source: Compiled by authors using data from the Municipal Registers (INE), 2003 and 2013.

16. The neighbourhoods of Llacuna, Vila Olímpica, Poble Nou, Diagonal Mar and Besòs.

17. The neighbourhoods of Barceloneta, El Raval, and Ciutat Vella.

Conclusions

The results obtained in this study allow us to state that, in general and despite the large increase of the foreign-born population living in the MAB, the levels of residential segregation of almost all immigrant groups, with respect to the Spanish-born population, are moderate to low and have tended to decrease between 2003 and 2013. The only exception to this general trend is that of Western Europeans, where a higher socioeconomic profile is combined with the recent downward change in their age structure and preferences of newcomers for neighbourhoods in the process of gentrification.

Although the main goal of this paper was not to disentangle and identify the causes of this process, we can convincingly argue that there are three major factors involved in the reduction of residential segregation within the MAB:

- first are the previously mentioned increases in population for all groups and the impact of this on residential segregation values (Simpson, 2004). Second and third are two interconnected processes;
- the high degree of suburbanization of the Spanish-born population, especially between 2000 and 2007 (Pujadas, 2009); and
- the considerable degree of internal mobility in all immigrant groups (Bayona, Gil-Alonso, 2012).

All these interacting phenomena result in widespread territorial diffusion of the new groups and in the sharp increase of mixed residential areas, in line with the spatial incorporation experiences of immigrants from other Southern European cities.

The larger part of the observed segregation at the MAB for all groups under analysis is due to the unevenness of their spatial distribution with respect to that of the Spanish-born population *within* municipalities, especially in the cases of Eastern Europeans, Africans and, most notably, Asians. This situation highlights the importance of social and family networks in regard to residential settlement choices. With regard to Africans and Asians, the general decrease in metropolitan segregation is mostly related to a reduction in segregation occurring *within* municipalities, suggesting an incipient decrease in isolation levels at the infra municipal scale. In the opposite direction, we observed an increase of both levels of segregation for Western Europeans. The interplay between the two trends suggests how segregation processes are increasingly taking on a metropolitan dimension, as well as the importance of internal resi-

dential mobility on its evolution. The methodology implemented in this paper constitutes an efficient way to approach the residential settlement of immigrant groups at the metropolitan scale, as well as to test postulates related to the role of suburbanization over the patterns of spatial segregation in Southern European cities.

In regard to the evolution of clustering areas, our results show the consolidation in 2013 of concentration areas that already existed in 2003, their expansion (markedly in the case of the Latin American population), and some sort of reconfiguration (for example, in the clustering areas of the Western European population). We find it particularly useful to monitor the evolution of clustering areas for two main reasons: on the one hand, as a way to address the spatial dimension of residential segregation territorially and consequently because of its usefulness in empirically informing debates related to the social incorporation of immigrant groups and the design of public policy and, on the other hand, because these areas nurture future inequalities between different population groups living in the MBA.

References

- ALBA R. D., LOGAN J. R., STULTS B. J., MARZAN G., ZHANG W.** (1999), «Immigrant Groups in the Suburbs: A Re-Examination of Suburbanization and Spatial Assimilation», *American Sociological Review*, 64, pp. 446-60, <https://doi.org/10.2307/2657495>.
- ANSELIN L.** (1995), «Local Indicators of Spatial Association – LISA», *Geographical Analysis*, 27, pp. 93-115, <https://doi.org/10.1111/j.1538-4632.1995.tb00338.x>.
- ARAMBURU M.** (2001), «El Mito de la ‘Huida’ Autóctona. El Caso de Ciutat Vella, Barcelona», *Scripta Nova, Revista Electrónica de Geografía y Ciencias Sociales*, 94 (63).
- ARBACI S.** (2008), «(Re)Viewing Ethnic Residential Segregation in Southern European Cities: Housing and Urban Regimes as Mechanisms of Marginalization», *Housing Studies*, 23, pp. 589-613, <https://doi.org/10.1080/02673030802117050>.
- ARBACI S., MALHEIROS J.** (2010), «De-Segregation, Peripheralisation and the Social Exclusion of Immigrants: Southern European Cities in the 1990s», *Journal of Ethnic and Migration Studies*, 36 (2), pp. 227-255, <https://doi.org/10.1080/13691830903387378>.
- BAYONA J.** (2007), «La Segregación Residencial de la Población Extranjera en Barcelona: ¿una Segregación Fragmentada?», *Scripta Nova. Revista Electrónica de Geografía y Ciencias Sociales*, XI (235).

- BAYONA J., GIL-ALONSO F.** (2012), «Suburbanisation and International Immigration: The Case of the Barcelona Metropolitan Region (1998-2009)», *Tijdschrift voor Economische en Sociale Geografie*, 103 (3), pp. 312-329, <https://doi.org/10.1111/j.1467-9663.2011.00687.x>.
- BAYONA J., LÓPEZ-GAY A.** (2011), «Concentración, Segregación y Movilidad Residencial de los Extranjeros en Barcelona», *Documents d'Anàlisi Geogràfica*, 57 (3), pp. 381-412, <https://doi.org/10.5565/rev/dag.234>.
- BOSCH M., CARNERO M. A., FARRÉ L.** (2015), «Rental Housing Discrimination and the Persistence of Ethnic Enclaves», *SERIEs Journal of the Spanish Economic Association*, 6 (3).
- CHACÓN-RODRÍGUEZ L.** (2002), «La Formación de la España Inmigrante: Mercado y Ciudadanía», *Reis*, 97 (2), pp. 95-126, <https://doi.org/10.2307/40184366>.
- CHANG V.** (2006), «Racial Residential Segregation and Weight Status among US Adults», *Social Science and Medicine*, 63, pp. 1'289-1'303.
- DENTON N.** (1996), «The Persistence of Segregation: Links between Residential Segregation and School Segregation», *Minnesota Law Review*, 80, pp. 795-824.
- DOMÍNGUEZ J., PARREÑO M., DÍAZ R.** (2010), «Inmigración y Ciudad en España: Integración Versus Segregación Socio-Territoriales», *Scripta Nova. Revista Electrónica de Geografía y Ciencias Sociales*, XIV, 331 (50).
- DUNCAN D., DUNCAN B.** (1955), «A Methodological Analysis of Segregation Indexes», *American Sociological Review*, 20, pp. 210-217, <https://doi.org/10.2307/2088328>.
- FARLEY R.** (1977), «Residential Segregation in Urbanized Areas of the United States in 1970: An Analysis of Social Class and Racial Differences», *Demography*, 14, pp. 497-518, <https://doi.org/10.2307/2060592>.
- FARRELL C. R.** (2014), «Immigrant Suburbanisation and the Shifting Geographic Structure of Metropolitan Segregation in the United States», *Urban Studies*.
- FUJITA K.** (2012), «Conclusion: Residential Segregation and Urban Theory», T. MALOUTAS, K. FUJITA (eds), *Residential Segregation in Comparative Perspective. Making Sense of Contextual Diversity*, City and Society Series, Ashgate, Farnham, United Kingdom, pp. 287-324.
- GALEANO J., BAYONA J.** (2015), «Assentament Territorial de la Població Estrangera a l'Àrea Metropolitana de Barcelona en el Segle XXI», A. Domingo (ed), *Migracions del Segle XX i XXI a Catalunya. Una Mirada Candeliana*, Col·lecció Ciutadania i Immigració, 11, Departament de Benestar Social i Família, Generalitat de Catalunya, pp. 95-121.
- GALEANO J., SABATER A., DOMINGO A.** (2014), «Formació i Evolució dels Enclavaments Ètnics a Catalunya abans i durant la Crisis Econòmica», *Documents d'Anàlisi Geogràfica*, 60 (2), pp. 261-288, <https://doi.org/10.5565/rev/dag.111>.

- GASTNER M. T., NEWMAN M.** (2004), «Diffusion-Based Method for Producing Density Equalizing Maps», *Proceedings of the National Academy of Sciences of the United States of America*, 101 (20), pp. 7'499-7'504, <https://doi.org/10.1073/pnas.0400280101>.
- GARCÍA-ALMIRALL P., FULLAONDO A., FRIZZERA A.** (2008), «Inmigración y Espacio Socio-Residencial en la Región Metropolitana de Barcelona», *Ciudad y Territorio, Estudios Territoriales*, 40, pp. 727-741.
- HERNÁNDEZ A., LÓPEZ-GAY A., ORTIZ A.** (2016), «Implicacions Socials de Tres Intervencions Urbanes al Casc Antic de Barcelona: el Mercat de Santa Caterina, el Pou de la Figuera i el Born Centre Cultural», *Treballs de la Societat Catalana de Geografia*, 81, pp. 111-136.
- HIRSCHMAN C.** (1983), «America's Melting Pot Reconsidered», *Annual Review of Sociology*, 9, pp. 397-423, <https://doi.org/10.1146/annurev.so.09.080183.002145>.
- LEAL J., SORANDO D.** (2016), «Economic Crisis, Social Change and Segregation Processes in Madrid», T. TAMMARU, S. MARCICZAK, M. VAN HAM, S. MUSTERD (eds), *Socio-Economic Segregation in European Capital Cities: East Meets West*, London/New York, Routledge, pp. 214-237.
- LICHTER D., PARISI D., TAQUINO M.** (2015), «Toward a New Macro-Segregation? Decomposing Segregation within and between Metropolitan Cities and Suburbs», *American Sociological Review*, 80 (4), pp. 843-873, <https://doi.org/10.1177/0003122415588558>.
- LOPEZ-GAY A.** (2014), «Population Growth and Re-urbanization in Spanish Inner Cities: The Role of Internal Migration and Residential Mobility», *Revue Quetelet/Quetelet Journal*, 2 (1), pp. 67-92.
- MALHEIROS J.** (2002), «Ethni-Cities: Residential Patterns in the Northern European and Mediterranean Metropolises – Implications for Policy Design», *International Journal of Population Geography*, 8, pp. 107-134, <https://doi.org/10.1002/ijpg.247>.
- MALOUTAS T., ARAPOGLOU V., KANDYLIS G., SAYAS J.** (2012), «Social Polarization and De-segregation in Athens», T. MALOUTAS, K. FUJITA (eds), *Residential Segregation in Comparative Perspective. Making Sense of Contextual Diversity*, City and Society Series, Ashgate, Farnham, United Kingdom, pp. 259-285.
- MALOUTAS T., FUJITA K.** (eds) (2012), *Residential Segregation in Comparative Perspective. Making Sense of Contextual Diversity*, City and Society Series, Ashgate, Farnham, United Kingdom.
- MARTÍNEZ A., LEAL J.** (2008), «La Segregación Residencial, un Indicador Espacial Confuso en la Representación de la Problemática Residencial de los Inmigrantes Económicos: el Caso de la Comunidad de Madrid», *ACE*, 3, pp. 53-64.
- MARTORI J. C., APPARICIO P.** (2011), «Changes in Spatial Patterns of the Immigrant Population of a Southern European Metropolis: The Case of the Barcelona Metropolitan Area (2001-2008)», *Tijdschrift voor Economische en Sociale Geografie*, 102 (5), pp. 562-581, <https://doi.org/10.1111/j.1467-9663.2011.00658.x>.

- MARTORI J. C., HOBERG K.** (2004), «Indicadores Cuantitativos de Segregación Residencial. El caso de la Población Inmigrante en Barcelona», *Scripta Nova. Revista Electrónica de Geografía y Ciencias Sociales*, VIII (169).
- MASSEY D., DENTON N.** (1988), «The Dimensions of Residential Segregation», *Social Forces*, 67, pp. 281-315, <https://doi.org/10.1093/sf/67.2.281>.
- MASSEY D., GROSS A., SHIBUYA K.** (1994), «Migration, Segregation, and the Geographic Concentration of Poverty», *American Sociological Review*, 59, pp. 425-445, <https://doi.org/10.2307/2095942>.
- MIRET N.** (2009), «Inmigración y Metropolización en Barcelona», *AREAS. Revista Internacional de Ciencias Sociales*, 28, pp. 103-116.
- PEACH C.** (1996), «The Meaning of Segregation», *Planning Practice and Research*, 11, pp. 137-150, <https://doi.org/10.1080/02697459650036297>.
- PUJADAS I.** (2009), «Movilidad Residencial y Expansión Urbana en la Región Metropolitana de Barcelona, 1982-2005», *Scripta Nova: Revista Electrónica de Geografía y Ciencias Sociales* 13, (290).
- SABATER A., BAYONA J., DOMINGO A.** (2012), «Internal Migration and Residential Patterns across Spain after Unprecedented International Migration», N. FINNEY, G. CATNEY (eds), *Minority Internal Migration in Europe, Surrey: Ashgate Publishing, International Population Studies Series*, XIV, pp. 293-311.
- SABATER A., MASSEY D.** (2015), «Contrasting Patterns of Migration and Settlement», A. DOMINGO, A. SABATER, R. VERDUGO (eds), *Demographic Analysis of Latin American Immigrants in Spain. From Boom to Bust*, Springer, (Applied Demography Series), (5), pp. 55-82, https://doi.org/10.1007/978-3-319-12361-5_3.
- SIMPSON L.** (2004), «Statistics of Racial Segregation: Measures, Evidence and Policy», *Urban Studies*, 41, pp. 661-681, <https://doi.org/10.1080/0042098042000178735>.
- STILLWELL J., VAN HAM M.** (2010), *Ethnicity and Integration: Understanding Population Trends and Processes*, London/New York: Springer, <https://doi.org/10.1007/978-90-481-9103-1>.
- TAEUBER K., TAEUBER A.** (1965), *Negroes in Cities: Residential Segregation and Neighborhood Change*, Chicago: Aldine Publishing Company.
- TAMMARU T., MUSTERD S., VAN HAM M., MARCICZAK S.** (2016), «A Multi-Factor Approach to Understanding Socio-Economic Segregation in European Capital Cities», T. TAMMARU, S. MARCICZAK, M. VAN HAM, S. MUSTERD (eds), *Socio-Economic Segregation in European Capital Cities: East Meets West*. (pp. 1-29). (Regions and cities; No. 89). London/New York: Routledge.
- THEIL H.** (1972), *Statistical Decomposition Analysis*, North-Holland Publishing Co.
- VAN HAM M., MANLEY D., BAILEY N., SIMPSON L., MACLENNAN D.** (eds) (2012), *Neighbourhood Effects Research: New Perspectives*, London, Springer, <https://doi.org/10.1007/978-94-007-2309-2>.

VAN KEMPEN R., ÖZÜEKREN S. (1998), «Ethnic Segregation in Cities: New Forms and Explanations in a Dynamic World», *Urban Studies*, 35 (10), pp. 1'631-1'656.

WILLIAMS D., COLLINS C. (2001), «Racial Residential Segregation: A Fundamental Cause of Racial Disparities in Health», *Public Health Reports*, 116, pp. 404-416, [https://doi.org/10.1016/S0033-3549\(04\)50068-7](https://doi.org/10.1016/S0033-3549(04)50068-7).

ZAPATA R. (2001), «La Relació entre els Immigrants i les Administracions: Onze Temes Bàsics per a Debatre Polítics d'Integració», *Papers de la Fundació*, 122.

Appendices

Formulas of the indexes

Dissimilarity Index

The index of dissimilarity (D) formulated by Duncan and Duncan (1955) was calculated using the following formula:

$$D = \frac{1}{2} \sum_{i=1}^n \left| \frac{x_i}{X} - \frac{y_i}{Y} \right| * 100$$

Here, x_i is the population of an X type within the i area, e.g. census tracts, municipalities; y_i is the population of a Y type within the i area, X is the total X population of the large geographic entity for which the index is being calculated, and Y is the total Y population of the large geographic entity for which the index is being calculated.

The resulting value of D was multiplied by 100 to facilitate the interpretation of the results as the percentage of the group under consideration which would need to change its place of residence to replicate the spatial distribution of the reference group (the Spanish-born population in this case).

Theil Index

The Theil Index (H) is based on the entropy concept (Theil, 1972). If two population groups are taken together (e.g. Latin Americans and Spaniards), can be formulated as follows:

$$E = p_i \ln \frac{1}{p_i} + (1 - p_i) \ln \frac{1}{1 - p_i}$$

Here, p_i is the proportion of Latin Americans. Computed over two population groups E reaches a maximum value of 0.69 when both groups are equally represented and a minimum value of 0 if there is only one group in the area under analysis. Taking the Metropolitan Area of Barcelona as the total geography (U) and census tracts as subunits (B) the Theil Index (H) can be expressed as:

$$H_{B U} = \frac{1}{N_U E_U} \sum_{b=1}^B N_b (E_U - E_b)$$

Here, N_U is the total population of the MAB, and N_b is the total population of the census tract. E_U is the overall entropy of the MAB and E_b is the entropy of the census tract.

To ascertain which part of the observed segregation for the MBA is taking place *within* municipalities and which *between* municipalities $H_{B U}$ is broken down as follows:

$$H_{B M} = \frac{1}{N_U E_U} \sum_{b=1}^B N_b (E_M - E_b)$$

to obtain the *within*-municipalities part of the overall segregation and

$$H_{MU} = \frac{1}{N_U E_U} \sum_{b=1}^M N_m (E_U - E_m)$$

for the overall segregation arising from the *between*-municipalities part.

The formula for I_i is:

$$I_i = z_i \sum_j w_{ij} z_j$$

Here, z_i is:

$$z_i = x_i - \bar{X}$$

And z_i is the original variable in its “deviation form”; x_i is the proportion of the population of the type x living in the census tract i and \bar{X} is the mean proportion of the population of all areas in ethnic group x ; w_{ij} is the spatial proximity weight for areas i and j (defined as the union of a proximity matrix of 500 metres with a supplementary k-nearest neighbour weigh matrix where $K=1$) and I_i is the value (distributed as Z) for area i . Since I has the same distribution as Z , statistically significant clusters of both concentration and relative absence can be identified directly by mapping its values.

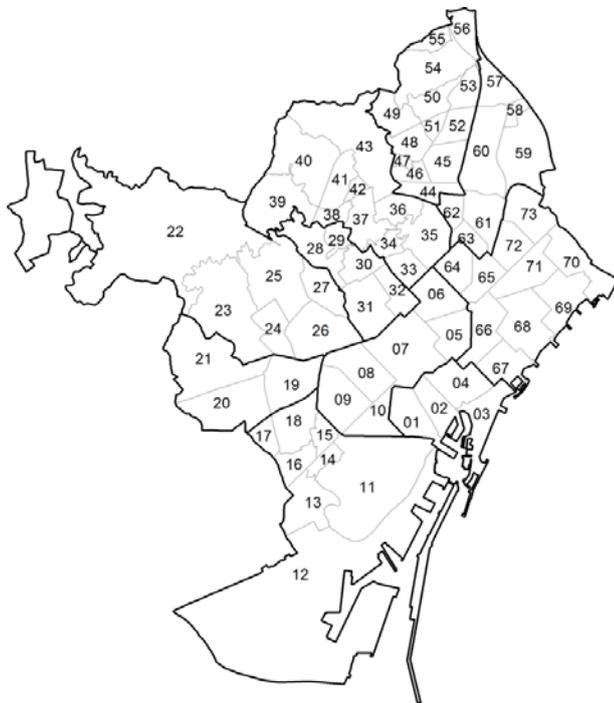
TABLE 1 Share of the observed metropolitan segregation occurring within municipalities

	2003					2013			
	Within	Between	Total	% intra		Within	Between	Total	% intra
Latin-America	0,08	0,05	0,13	61,2	Latin-America	0,07	0,05	0,12	60,8
Ecuador	0,15	0,05	0,20	74,5	Ecuador	0,13	0,06	0,19	66,0
Western-Europe	0,06	0,04	0,10	61,0	Western-Europe	0,09	0,06	0,16	59,2
France	0,05	0,02	0,07	74,3	France	0,07	0,04	0,10	65,3
Eastern-Europe	0,17	0,03	0,20	86,0	Eastern-Europe	0,06	0,02	0,08	78,7
Romania	0,24	0,03	0,27	88,6	Romania	0,10	0,03	0,14	75,8
Africa	0,17	0,02	0,18	89,8	Africa	0,13	0,04	0,17	78,8
Morocco	0,18	0,03	0,21	86,1	Morocco	0,14	0,05	0,19	74,8
Asia	0,29	0,06	0,36	82,4	Asia	0,23	0,07	0,30	77,0
Pakistan	0,50	0,07	0,57	87,9	Pakistan	0,36	0,07	0,43	84,1
2003-2013 (absolute)					2003-2013 (relative)				
	Within	Between	Total	% intra		Within	Between	Total	% intra
Latin-America	0,00	0,00	-0,01	-0,4	Latin-America	-4,9	-3,2	-4,2	-0,7
Ecuador	-0,02	0,01	-0,01	-8,5	Ecuador	-15,8	26,5	-5,0	-11,4
Western-Europe	0,03	0,03	0,06	-1,8	Western-Europe	52,6	64,6	57,3	-3,0
France	0,02	0,02	0,04	-9,0	France	34,2	105,9	52,6	-12,1
Eastern-Europe	-0,11	-0,01	-0,13	-7,3	Eastern-Europe	-65,5	-42,6	-62,2	-8,5
Romania	-0,14	0,00	-0,14	-12,8	Romania	-57,5	5,8	-50,3	-14,5
Africa	-0,03	0,02	-0,02	-11,0	Africa	-20,9	86,9	-9,8	-12,2
Morocco	-0,04	0,02	-0,02	-11,2	Morocco	-22,8	60,1	-11,2	-13,0
Asia	-0,06	0,01	-0,05	-5,4	Asia	-20,7	10,9	-15,1	-6,5
Pakistan	-0,14	0,00	-0,14	-3,8	Pakistan	-27,9	-0,6	-24,6	-4,4

Source: Compiled by authors using data from the Municipal Registers (INE), 2003-2013.

FIGURE 1 Metropolitan area of Barcelona: Municipalities

Source: Compiled by authors.

FIGURE 2. Municipality of Barcelona: Neighbourhoods

Ciutat Vella	Horta-Guinardó
1. El Raval	33. Baix Guinardó
2. Barri Gòtic	34. Can Baró
3. Barceloneta	35. El Guinardó
4. Sant Pere, Santa Caterina i la Ribera	36. La Font d'en Fargues
L'Eixample	37. El Carmel
5. El Fort Pienc	38. La Teixonera
6. La Sagrada Família	39. Sant Genís dels Agudells
7. Dreta de l'Eixample	40. Montbau
8. Antiga Esquerra de l'Eixample	41. Vall d'Hebron
9. Nova Esquerra de l'Eixample	42. Clota
10. Sant Antoni	43. Horta
Sants-Montjuïc	Nou Barris
11. Poble Sec – Parc Montjuïc	44. Vilapicina i la Torre Llobeta
12. Marina del Prat Vermell - Zona Franca	45. Porta
13. Marina de Port	46. Turó de la Peira
14. Font de la Guatlla	47. Can Peguera
15. Hostafrancs	48. Guineueta
16. La Bordeta	49. Canyelles
17. Sants – Badal	50. Roquetes
18. Sants	51. Verdun
Les Corts	52. Prosperitat
19. Les Corts	53. Trinitat Nova
20. La Maternitat i Sant Ramon	54. Torre Baró
21. Pedralbes	55. Ciutat Meridiana
Sarrià-Sant Gervasi	56. Vallbona
22. Vallvidrera, el Tibidabo i les Planes	Sant Andreu
23. Sarrià	57. Trinitat Vella
24. Tres Torres	58. Baró de Viver
25. Sant Gervasi – la Bonanova	59. Bon Pastor
26. Sant Gervasi – Galvany	60. Sant Andreu
27. Putxet i el Farró	61. Sagrera
Gràcia	62. Congrés i Indians
28. Vallcarca i els Penitents	63. Navas
29. El Coll	Sant Martí
30. La Salut	64. Camp de l'Arpa del Clot
31. Vila de Gràcia	65. Clot
32. Camp d'en Grassot i Gràcia Nova	66. Parc i la Llacuna del Poblenou
	67. Vila Olímpica del Poblenou
	68. Poblenou
	69. Diagonal Mar i Front Marítim del Poblenou
	70. Besòs i Maresme
	71. Provençals del Poblenou
	72. Sant Martí de Provençals
	73. Verneda i la Pau

Source: Compiled by authors.