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Exploring the origins of depopulation in Spain: the construction of a population grid for 1887

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Abstract:

Recent events, in which the least favoured territories or "places that do not matter" have revolted through the ballot box, call into question the results achieved in terms of balanced and inclusive development in the most developed countries.¹ With this in mind, understanding the origins, evolution and causes of territorial imbalances is paramount. Within this framework, and especially in the case of Spain, one of the elements of greatest concern is the unequal distribution of the population in the territory, i.e. the coexistence of densely populated areas with territories characterised by the virtual absence of population and economic activity.

The studies that have approached the problem from a long-term perspective, either from Economic History (Collantes and Pinilla, 2019; Collantes, 2020) , Human Geography or Historical Demography (Goerlich et al. 2006; Franch-Auladell et al., 2017; Recaño, 2023) have argued that the current distribution of the population in the territory is the result of a long process, marked by the initial conditions and, above all, by the profound socio-economic and institutional transformations that have taken place since the start of contemporary economic development in the mid-19th century. However, one of the limitations faced by these studies is that the analysis of the changes in the settlement of the population, the emptying or not of the territory, has been

¹ Rodríguez-Pose (2018).

constructed fundamentally from the consideration of the evolution of the size of the municipalities.² However, settlement patterns and size of municipalities are two related but substantially different dimensions of the problem. In fact, for the Spanish case, given the heterogeneity that characterises the municipality as administrative unit, the evidence provided at this scale of aggregation constitutes a limited approximation of the real settlement of the population in the territory.

In order to overcome this limitation, these study presents a methodology that allows the construction of a spatial data infrastructure that offers a rigorous description, at a granular scale, of the settlement patterns of the population at the dawn of the process of economic development. This is built from the information contained in two primary sources: the *Nomenclátor* of Spain of 1887 (NE1887) and the Cadastre. On the one hand, the NE1887 offers data on the *de facto* and *de jure* population and the number of habitable buildings for a total of 118,367 settlements, 106,944 of which are identified as singular entities. Among them, 42,212 are classified as cities, towns, places or villages. On the other hand, the Cadastre's property database provides the year of registration, use and location of existing buildings on different dates.

On the basis of these sources, a historical grid of the distribution of the population has been constructed. This task has been carried out in two main stages. In the first, the combined use of automatic image recognition techniques and the programming of learning algorithms (OCR and Machine Learning) has been used to extract the qualitative and quantitative information collected in the NE1887. Afterwards, we have carried out the matching of the population entities existing in 1887 with those related in different platforms (*Nomenclátor General Básico de España*, hereinafter NGBE; *Nomenclátors* elaborated by the different regional agencies; Open Street Maps, hereinafter OSM) by programming an algorithm that performs the assignment using numerical information (municipality and province codes), alphabetical information (toponyms). With this, given that these sources offer the geolocation of the population entities, the link between the NE1887 and the current repertoires has allowed the spatial processing of the information extracted for 1887, converting this data infrastructure into a spatial data infrastructure. In particular, it has been possible to identify the geographical location of approximately 65,000 population entities out of the total of 106,944 singular entities that make up Spain according to the NE1887. It accounts

² In this sense, the works of Infante-Amate et al. (2017) or Ayuda et al. (2023) would be exceptions to this rule as they analyze the settlement of the population at a territorial aggregation scale smaller than the municipality: the population entity. Another exception would be the works of Oto-Peralías (2017), Gutiérrez et al. (2020) or Gutiérrez et al. (2023), who use the population grid offered by EUROSTAT (GEOSTAT2011) to quantify the emptying of the Spanish territory. In this series of works, the low occupation of the territory, especially in the south of the peninsula, is related to the way in which it was repopulated, in a context of high risk of armed conflict, during the Reconquista (Gutiérrez et al. 2023). The accreditation of this hypothesis rests on the consideration of the distribution of the population in the territory collected in the *Censo de Pecheros* of 1528 or the *Floridablanca Census* of 1787, which relate to the existing population entities on both dates. However, since their location is unknown, it is approximated to the coordinates corresponding to the head of the municipality in which they are currently circumscribed, so again, the starting hypothesis is verified from evidence that is offered at a territorial aggregation scale that corresponds to the municipality and that hides the heterogeneity typical of the Spanish geography.

for the geolocation of around 60% of the singular entities, in which more than 90.0% of the Spanish population was settled in 1887.³

In the second, we proceeded with gridding. That is, with the distribution of the population by entity, obtained from NE1887, in the territory. The procedure followed was based fundamentally on the information contained in the Cadastre. In particular, the information corresponding to buildings registered at a date equal to or prior to 1900 was used, including their location. Based on this information, firstly, the buildings listed in the Cadastre were classified in such a way that a distinction was made between those that make up nuclei and those that are isolated. For each group of buildings classified as belonging to a nucleus, the polygon surrounding it and in which the corresponding population will be located has been traced. Once the buildings have been classified in these two categories, the population has been distributed among them. The population resident in singular entities for which geolocation is available has been assigned to the polygons that include their coordinates. The rest of the population, resident either in non-georeferenced singular entities or in what NE1887 describes as scattered buildings, has been distributed as follows. Those residing in non-georeferenced singular entities have been assigned to building polygons that have not been used in the first step. Those living in scattered buildings have been distributed among the buildings that have been previously classified as isolated. This procedure has been implemented municipality by municipality and ensures, at least, that the population is distributed among those locations that had habitable buildings circa 1900, using the contours drawn by these buildings at the time. With this background, finally, geographic information systems (GIS) have been used to program the algorithm that maps a grid of the settlement of the population in the territory at the end of the 19th century (1887), distributing it in cells of 1 km², which can be compared with those constructed recently, such as GEOSTAT2021.⁴

Therefore, the work carried out allows us to offer a spatial vision of the settlement of the population in Spain in the second half of the 19th century and to compare it with the current situation. The initial results indicate that the number of occupied cells has increased from 18.60% of the territory to 22.57% (i.e., it has grown by around 21%). If we consider that during the period between 1887 and 2021 the Spanish population has multiplied by a factor of 4.6., from 10,268,110 inhabitants in 1887 to 47,487,400 in 2021, we can conclude that over these period there has been a strong increase in the density experienced (volume of population per inhabited cell). However, it should be noted that this process has not occurred homogeneously across space. The new evidence precisely shows

³ The description of the source and the detail on the process of extracting the information, carried out within the framework of the ESPAREL project (Spain from the Old Regime to the Liberal State), can be found in Beltrán-Tapia et al. (2022). The use of the Nomenclator of 1887 to offer a spatial approximation to the distribution of the population in the territory in different geographical environments has been the subject of attention in different works. For example, Esteve (2003) or Sancho Comins et al. (2012) offer this type of evidence for Catalonia and the province of Guadalajara respectively.

⁴ The comparison can also be established with the other two information structures developed by EUROSTAT in recent years, GEOSTAT2006 and GEOSTAT2011. In this sense, GEOSTAT2011 is the grid used in Gutiérrez et al. (2021) and (2023). A critical analysis of this spatial data infrastructure is found in Goerlich and Cantarino (2017).

which part of the inland territory of Spain has been emptied and which areas has experienced the biggest growth with the expansion of the metropolitan areas of the large cities and of the residential and tourist areas.

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