Title: Unravelling the recent sociodemographic and geographic determinants of depopulation in Southern Europe.

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Extended abstract:

1. <u>Introduction and background</u>

In recent years, Spain and Italy have established themselves as two countries with strong territorial imbalances, among which heterogeneous demographic growth stands out. In Spain, this heterogeneity is manifested in the dichotomy between inland regions and the Mediterranean coast (Collantes and Pinilla, 2011; Recaño Valverde, 2023), while in Italy it is reflected in the division between north and south (Rizzo, 2016; Reynaud & Miccoli, 2018).

To understand these imbalances, it is essential to consider that, beyond their distinctive characteristics, Spain and Italy share a common historical narrative, marked by simultaneous processes of internal migration and depopulation since the mid-20th century (Collantes & Pinilla, 2011; Del Panta & Detti, 2019). These inherently interconnected phenomena have left a lasting imprint on the demographic and territorial configuration of both countries (Recaño, 2023).

Both southern European territories are currently experiencing an accelerated ageing process (Reynaud & Miccoli, 2018). This phenomenon is attributed to the increase in life expectancy and a decline in the birth rate, marked by the exit of the baby boom generations from the fertile ages and the entry of smaller generations, corresponding to the low fertility periods of the 1990s (Carioli et al., 2021). On the other hand, it is crucial to highlight that demographic decline is no longer limited exclusively to rural areas; it also affects some small urban areas and even certain provincial capitals (Gil Alonso et al., 2021; González Leonardo, 2021), adding complexity to the demographic dynamics of both countries.

However, territorial disparities in population growth are not limited to unequal demographic developments alone, but emerge from the complex interaction of various factors, including geographical determinants. Although there is research showing that geospatial components can either favour or hinder population growth in particularly significant ways (Holl, 2019; Reynaud et al., 2020), this field remains relatively unexplored. Nevertheless, in recent years, there has been a growing interest in incorporating certain spatial factors when exploring the determinants of population growth, addressing aspects such as altitude (Goerlich et al., 2015; Recaño, 2020), latitude, longitude and proximity to the coast (Gutiérrez Posada et al. 2017; Serra et al., 2014).

The heterogeneous population growth shared by both nations raises crucial questions, inviting in-depth reflection and a comprehensive analysis that seeks to understand the complexities inherent in this challenge, from a comparative perspective. To this end, it is argued that socio-demographic and geographic factors are important drivers of the spatial variability of growth rates at the local level. The main objective of this research is to identify and compare the demographic and geographical determinants that have recently intervened in population growth in Spain and Italy.

2. Methodology
2.1. Data and variables

The selection of the sources and the variables is based on two important factors: the accelerated depopulation process and the alignment of the study period from beginning to end with the publication of the most recent censuses in Spain and Italy, which are the statistical reference sources in this research.

The study examined the NUTS4 spatial units, a local administrative unit recognised by Eurostat. However, within the time frame of the study, there were changes related to the merging and segregation of municipalities. This posed a challenge in ensuring the comparability of information over time. To address this issue, a reconstruction process was undertaken to harmonise the statistical content for both countries by referring to the municipal terms of the 2021 census. This process resulted in the creation of a database of more than 16.000 observations, 8.131 from Spain and 7.903 from Italy.

The data set comprises 57 variables of a demographic and geographical nature. Demographically, it includes information on population size, real growth rate and a comprehensive breakdown of growth components, sex ratio, overall and age-specifics fertility rate, median population age and other population structure-related variables. Geographically, eight variables were considered: municipal area, density, degree of urbanisation, altitude, latitude, longitude, proximity to the sea and distance to the provincial capital.

2.2. Statistical methods

In order to assess the impact of the independent variables on our dependent variable (population growth rate 2011-2021), we will construct different multiple regression models. Firstly, an Ordinary Least Squares (OLS) model will be constructed to estimate the standardised contribution of different growth components: birth rate, mortality, emigration and internal immigration, emigration and international immigration in both of the countries using local data. We will conduct two separate regressions for each country and a combined one, deriving standardised beta coefficients to measure the role of each component in the growth of the two countries (Table 1). Secondly, we will assess the role of various geographical, demographic and socio-economic variables on growth using ordinary least squares. These methods will be complemented by the application of spatial econometric indicators and a Geographical Weighted Regression (GWR), which assess the local impact of the independent variables on local growth.

*Table 1: Multiple regression análisis of population growth rate*

Regression model with OLS

	Spain	Italy
Intercept		
Crude Birth rate	,193	,231
Crude Date rate	-,387	-,523
Internal immigration rates	1,113	1,488
Internal emigration rates	-1,045	-1,298
International immigration rates	,402	,488
International emigration rates	-,276	-,370

3. <u>Preliminary results</u>

Firstly, a descriptive analysis was conducted to examine the population's distribution and the changes in population dynamics during the period 2011-2021. This process not only provides us with an overview of the situation in the two countries, but also helps us to explore it in a more detailed analysis of the factors that influence the loss of population.

The first map shows significant variability in the population growth patterns of Spanish and Italian municipalities. While in Spain population loss mainly affects inland regions and the north-west of the peninsula (Collantes and Pinilla, 2011; Recaño Valverde, 2023), in Italy, it is the southern regions that face the most significant demographic challenges (Rizzo, 2016; Reynaud & Miccoli, 2018).

Map 1: Distribution of population growth rates for the period 2011-2021
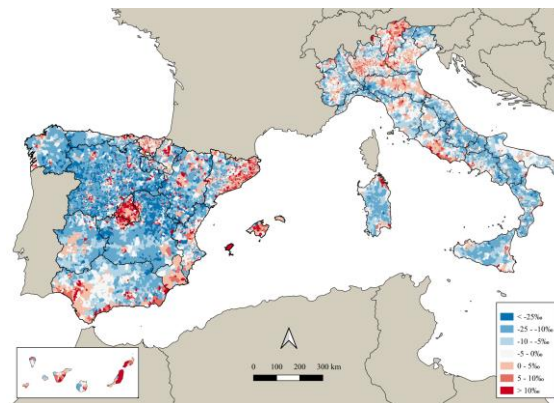

The analysis of the natural and migratory components also reveals a heterogeneous space, contrasting places with positive demographic dynamics and profoundly negative areas.

From the perspective of natural dynamics, it is relevant to note that the decrease in the number of births (Carioli et al., 2021) and the slight increase in mortality due to population ageing (Reynaud & Miccoli, 2018) determine a negative natural balance in both countries. When analysing the distribution of natural increase rates (map 2), in the case of Spain, the areas with the lowest results are concentrated in the north-west of the peninsula, while the highest rates are observed between Madrid and the Mediterranean coast. In Italy, all regions show a negative natural increase, with the exception of Trentino Alto Adige and some areas in the south, which suggests that natural increase is the component that most influences population growth.

As far as migration dynamics are concerned, both countries have negative balances. The analysis of the distribution of net migration rates (see map 3) shows that, with the exception of Madrid, Spain has a centre-coast dichotomy. While Madrid, the Balearic Islands, the Canary Islands and Catalonia would be the regions with the highest net migration rates, the lowest results would be distributed by Castilla y León, Castilla-La Mancha and Extremadura. In Italy, the southern part is again the most affected, with Calabria and Basilicata being the regions with the lowest negative balances. Conversely, Emilia Romagna and Tuscany display the highest migration rates in the country.

Map 2: distribution of natural growth rates for the period 2011-2021.
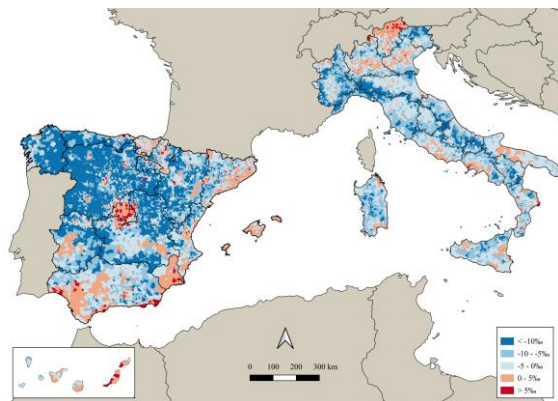
Map 3: distribution of net migration rates for the period 2011-2021.
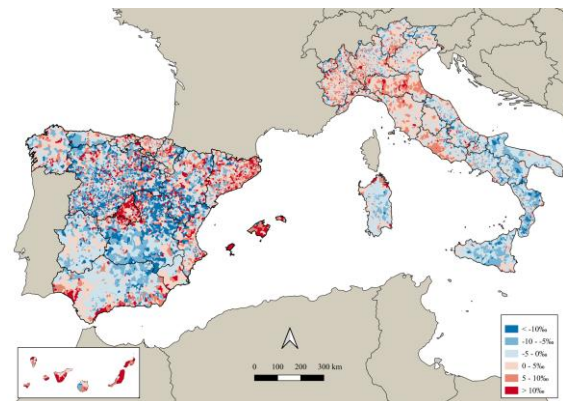
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