MIGRATION AND POPULATION CHANGE PATTERNS: A COMPARISON BETWEEN ITALIAN AND SPANISH REGIONS

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Abstract. This paper presents a comparative regional analysis on the role played by migration in recent population change in Italy and Spain. Annual data have been used on Italian regions and Spanish autonomous communities (NUTS-2 level) on all factors driving population growth for the period 2008-2021. The methodology includes the estimation of three indices: the Population Turnover Rate (PTR), Migration Share of Turnover (MST) and Birth Share of Turnover (BST). The analysis reveals marked differences between Spain and Italy: while international migration has driven most population turnover across all regions in Spain, especially after 2013, in Italy population turnover is mostly driven by both components and in particular by the BST due to the contribution of births from the foreign population in the northern regions and the lower incidence of migration in the southern regions.

1. Introduction

Traditional demographic research has predominantly emphasised the paradigm of "slow demography" in which population change is perceived as gradual, mainly driven by natural components—namely fertility and mortality—and therefore somewhat predictable. However, recent studies have reasserted the dual nature of demographic processes by highlighting the significance of "fast demography," which pertains to the effects of migration (Billari, 2022). Indeed, the spatial mobility of populations calls into question the assumption that demographic dynamic is inertial and exogenous showing that migration can exert a substantial and rapid influence on population change, according to its magnitude across time and space.

In this regard, Italy and Spain represent two emblematic cases in Southern Europe where migration has become a crucial factor over time in shaping population growth and in counterbalancing or compensating for the low fertility levels of native women (Giannantoni and Strozza, 2015; del Rey and Cebrián, 2010). Indeed, in the last decades these two countries have experienced a fast population ageing process and a sharp decline in birth and fertility rates that rank them among the lowest fertility levels worldwide (Lozano *et al.*, 2024). Italy and Spain are also characterized by significant territorial imbalances in demographic dynamics and its components. Recent studies have shown that in both countries natural decrease (more deaths than

births) is the main driver of population decline while net migration (especially international) is the only factor contributing to population growth (Marbán-Martínez *et al.*, 2025; Buonomo *et al*., 2024). It should be noted, however, that these common trends are spatially differentiated and exhibit heterogenous geographic patterns that mostly depend on the traditional North-South divide in Italy and on the differences between internal and coastal areas in Spain

Building on these premises, the principal aim of this study is to analyse the role played by the components of the demographic dynamic on recent population change in Italy and Spain for the period from 2008 to 2021. More specifically we seek to examine the contribution of migration to the population change at regional level observing the patterns produced by internal and international movements.

Our contribution to existing literature on this topic consists of:

(i) deepening the understanding of how natural and migratory components of the population change have shaped the demographic dynamics of regions in Italy and Spain using the Population Turnover Rate (PTR) (Billari, 2022);

(ii) verifying whether the contribution of these components have exhibited national and chronological similarities or differences over the last years;

(iii) adopting a diachronic and transnational approach in assessing and comparing the contribution of migration to the population change across regions.

2. Background

Historically, the demographic dynamics of countries have been primarily shaped by changes in mortality and fertility, with migration playing a secondary role. However, over the past half-century, developed countries have undergone a profound transformation in the relative importance of the components of demographic change. Various studies have highlighted the key role played by migration in population change (Preston and Wang, 2007; del Rey and Cebrián-Villar, 2010; Ediev *et al*., 2014). In the specific case of Southern European countries, demographic dynamics in recent decades have been characterized by very low levels of mortality and fertility, which has placed migration at the forefront of population change in these countries (del Rey and Ortega, 2010).

Migration directly alters the size of the population, but it also affects the evolution of births due to the unequal—and generally higher—fertility of the immigrant population compared to the native population (Carella *et al*., 2021; García-Gómez *et al*., 2023; García-Gómez and del Rey, 2023). Several studies have shown that the higher fertility of immigrant women contributes to a significant increase in the number of births in destination countries (Roig-Vila and Castro-Martín, 2007). Thus, the impact of migration on population change over time is determined both by the size of the immigrant population and by its reproductive behaviour.

Nevertheless, the arrival of immigrants has considerably differed across Spanish and Italian regions (del Rey and Ortega, 2010; Casacchia *et al*., 2022). In this sense, findings of previous research on the decomposition of the population growth rate have shown an asymmetric evolution of demographic processes at territorial level across Spanish regions (Del Rey and Ortega, 2010) and municipalities (Marbán Martínez *et al*., 2025). While certain regions have experienced significant population growth and managed to limit the decline in birth rates thanks to immigration, others, by contrast, have witnessed a sharp decrease in both population and births due to the limited reception of international migrants (Orfao *et al*., 2025). Consequently, while some regions currently face the depopulation of rural areas as their main challenge, others are dealing with strong population growth and concentration. In the Italian case, recent studies on demographic dynamics concerning the municipalities have shown that the population change is spatially differentiated across growing and shrinking cities (Buonomo *et al*., 2024). In the first ones the population growth is mostly produced by positive net migration, especially international. It seems that the traditional North–South demographic divide is evolving into a more nuanced pattern of leading (growing) and lagging (declining) urban and sub-urban areas.

Based on these postulates we defined the following research questions:

RQ1: How fast has been demography over the last years? How have Population Turnover Rate (PTR), Births' Share of Turnover (BST) and Migration Share of Turnover (MST) evolved at regional level in Italy and Spain? (temporal variability)

RQ2: Can we observe population change patterns between the two countries and across their regions? (spatial variability)

3. Data and Methods

This study gathers administrative data from the Population Register of the resident population, provided by the Italian National Institute of Statistics (ISTAT), and the Residential Variation Statistics (EVR) of the Municipal Register and the Natural Movement of the Population (MNP), both compiled by the Spanish National Institute of Statistics (INE). These databases allow us to obtain harmonised and homogeneous annual data at the regional level using Italian regions and Spanish autonomous communities as the territorial units of reference (NUTS-2 level) on all factors driving population growth for the period 2008-2021. Accordingly, the core variables used in this paper include total population, births, deaths, and both internal and international migration.

Migration data comprise annual flows of immigration and emigration at the NUTS2 level, enabling the examination of population mobility dynamics in both countries over time. Moreover, internal and international movements have been distinguished in order to identify different patterns at the regional level. The temporal framework is divided into three periods: 2008-2013, 2014-2019, and 2020-2021.

These periods allow for a detailed breakdown of the contribution of each component to overall population growth during the Great Recession, the subsequent recovery period, and the recent COVID-19 pandemic.

To measure population change between *t* and *t-1* for each Spanish and Italian region *j*, we estimate the Population Turnover Rate (PTR) and Migration Share of Turnover (MST) indicators proposed by Billari (2022). The PTR can be calculated as follows:

$$PTR_{j\,(t-1,t)} = b_{j\,(t-1,t)} + d_{j\,(t-1,t)} + i_{j\,(t-1,t)} + e_{j\,(t-1,t)}$$

where

$$b_{j\,(t-1,t)} = \frac{B_{j\,(t-1,t)}}{t \times P_{j\,(t-1,t)}};\ d_{jk(t-1,t)} = \frac{D_{j\,(t-1,t)}}{t \times P_{j\,(t-1,t)}}\ ;\ \ i_{j\,(t-1,t)} = \frac{I_{j\,(t-1,t)}}{t \times P_{j\,(t-1,t)}}\ \ ;$$

$$e_{j\,(t-1,t)} = \frac{E_{j\,(t-1,t)}}{t \times P_{j\,(t-1,t)}}$$

being $B_{j(t-1,t)}$ the total number of births, $D_{j(t-1,t)}$ the deaths, $I_{j(t-1,t)}$ the entries and $E_{j(t-1,t)}$ the exits, between periods *t-1* and *t*. Once the PTR has been calculated, we analyse the specific contribution of migration to the total population change by calculating the MST:

$$MST_{j\,(t-1,t)} = \frac{i_{j\,(\boldsymbol{t-1,t})} + e_{j\,(\boldsymbol{t-1,t})}}{PTR_{j\,(\boldsymbol{t-1,t})}} = \frac{I_{j\,(\boldsymbol{t-1,t})} + E_{j\,(\boldsymbol{t-1,t})}}{B_{j\,(\boldsymbol{t-1,t})} + D_{j\,(\boldsymbol{t-1,t})} + I_{j\,(\boldsymbol{t-1,t})} + E_{j\,(\boldsymbol{t-1,t})}}$$

A further contribution of this paper is the development of a new indicator, the Birth's Share of Turnover (BST), which captures the contributing role of births to population change. This indicator can be defined as:

$$BST_{j\,(t-1,t)} = \frac{b_{j\,(\boldsymbol{t-1,t})}}{PTR_{j\,(\boldsymbol{t-1,t})}} = \frac{B_{jk(\boldsymbol{t-1,t})}}{B_{j\,(\boldsymbol{t-1,t})} + D_{j\,(\boldsymbol{t-1,t})} + I_{j(\boldsymbol{t-1,t})} + E_{j(\boldsymbol{t-1,t})}}$$

4. Results

Figures 1 and 2 show a similar trend in the reduction of the PTR in both Italy and Spain. In Spain, a moderate decline in the PTR is observed between 2008 and 2021, averaging approximately 6 points, though regional variation ranges from 3 to 12 points. Interestingly, the highest PTR values are recorded in those regions that have

experienced population growth, whereas the lowest values are found in regions facing population decline. This pattern suggests that regions experiencing population growth are undergoing continuous demographic changes, potentially driven by migration dynamics. Similarly, Italy exhibits a more consistent and marked decrease in the PTR over the same period, with an average reduction of 8 points. These trends indicate a general slowdown in population growth across both countries during the years analysed.

Figure 1 – *SPAIN: Population change decomposition across regions: a) Population turnover rate (PTR); b) Migration share of turnover (MST) and c) Births' share of turnover (BST).*

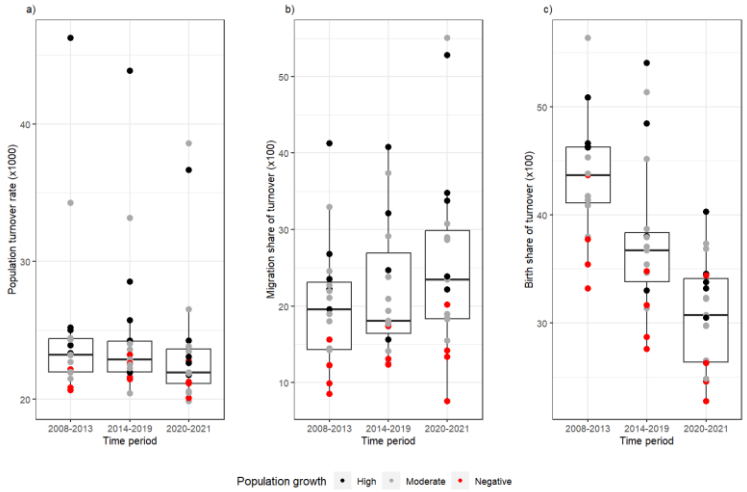


Figure notes. The regions were categorized according to their population growth rate over the period 2008-2021: Negative: Regions with a negative population growth rate, grouped together regardless of their values. Moderate: Regions with a positive growth rate that fall within the third quartile of the distribution. High: Regions with a positive growth rate that belong to the fourth (top) quartile of the distribution.

By delving deeper into recent regional migration trends, two contrasting patterns emerge in Spain and Italy. Spain exhibits a growing migration trend in the majority of regions, although this increase is almost negligible in regions suffering population decline during the period 2008-2021. By contrast, Italy shows a decrease in the MST across most regions, reflecting a declining contribution of migration to overall population growth. Notably, the share of turnover attributable to migration is higher in Spain than in Italy, indicating a stronger (although asymmetric) attraction of migration flows across Spanish regions.

Figure 2 – *ITALY: Population change decomposition across regions: a) Population turnover rate (PTR); b) Migration share of turnover (MST) and c) Births' share of turnover (BST).*

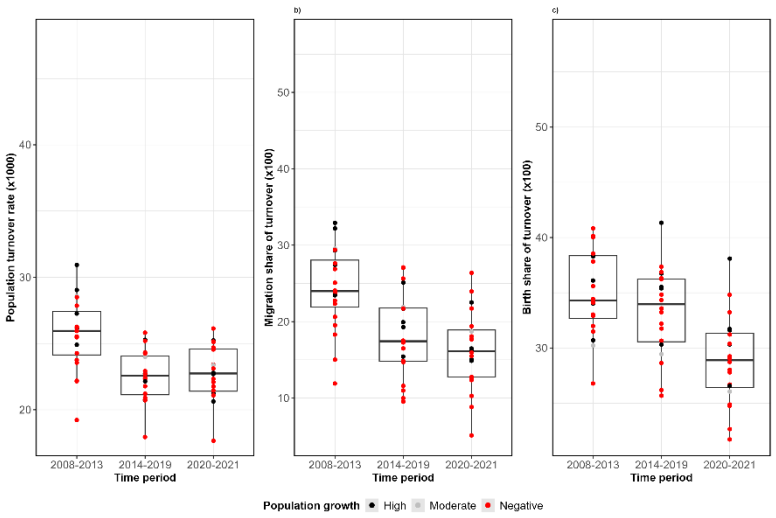


Figure notes. Idem as above

When analysing the contribution of births through the BST indicator, we find a similar pattern in both countries, with births playing a weaker role in explaining recent population changes. Nevertheless, regional differences are evident. For instance, in both countries, the BST is higher in regions that experienced population growth during the period 2009-2021 compared to those that recorded population decline. Interestingly, the BST is higher in Italy than in Spain, likely due to the greater contribution of the MST to population growth in Spain.

In Italy, both the MST and BST components influenced the PTR, however, in most cases, the BST (or more broadly, the natural component including deaths) was predominant. This is because foreigners contributed more significantly to demographic changes through births in the northern regions, whereas in the southern regions, where the MST had a lower weight, the natural component played a more substantial role. Specifically, the BST was higher in central regions (such as Lazio) and in northern regions (including Lombardy and Veneto), which notably attracted a considerable higher share of foreign population. Additionally, elevated BST values were observed in Trentino and in southern regions (like Apulia, Sicily, Campania, and Sardinia), where migration's contribution to the PTR was comparatively lower.

In Spain, the BST displays a common trend across all regions, reflecting a decline in the contribution of births to population growth. When examining specific regions,

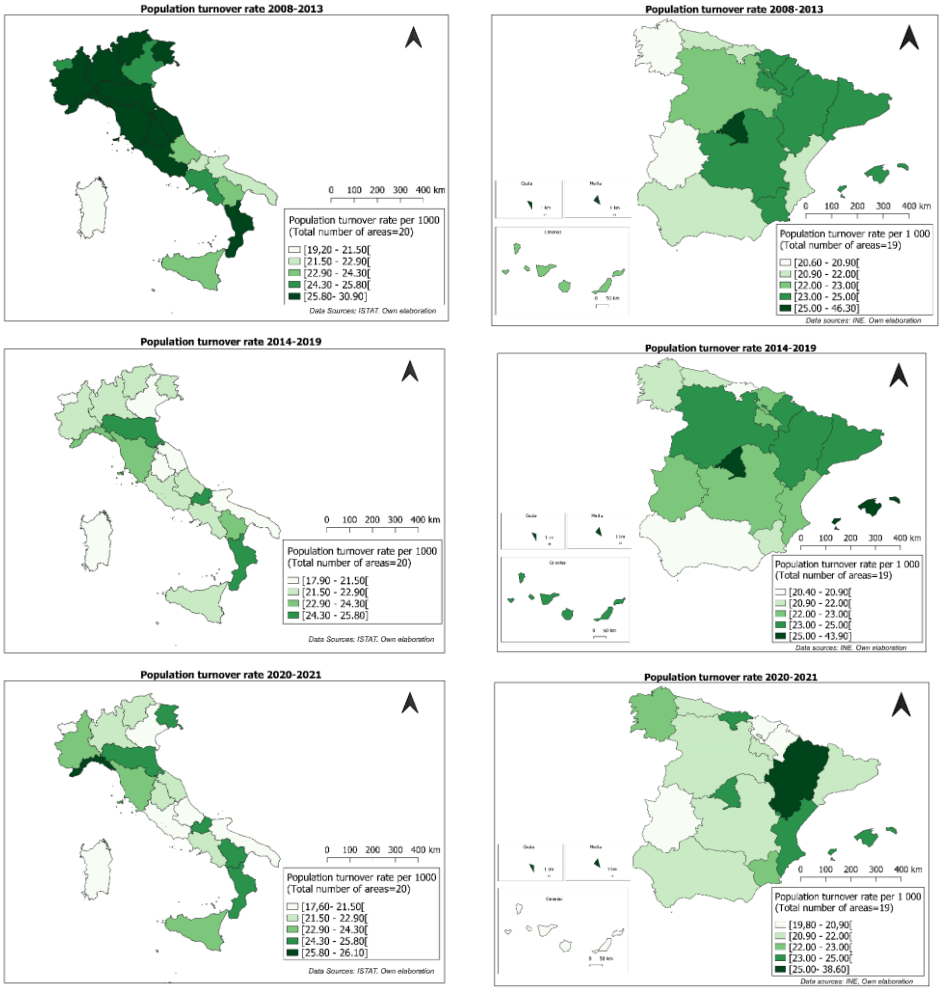
the BST's contribution is greatest in the Community of Madrid and Catalonia, which attract the largest share of migrants entering Spain. By contrast, the highest relative contribution of the BST to overall population change is observed in Andalusia and Extremadura. This elevated contribution, compared to other regions, can be attributed to the lower influence of the MST, as these regions are characterised by relatively low levels of both internal and international migration.

After analysing the overall population changes in Spain and Italy during the period 2009-2021, we further explore the spatial and temporal trends of both the Population Turnover Rate (PTR) and Migration Share of Turnover (MST) at the NUTS-2 level across three subperiods: the financial economic crisis, the post-crisis recovery, and the COVID-19 pandemic.

Figure 3 illustrates the changes in PTR across Italian and Spanish NUTS-2 regions during the Great Recession (2008-2013), post-crisis recovery (2014-2019), and the COVID-19 pandemic (2020-2021). In Italy, the northern and southern regions were respectively the most affected by incoming and outgoing migration flows, which corresponds to these regions exhibiting the highest PTR values nationwide. Moreover, territorial disparities in population change patterns have remained consistent throughout the analysed periods, although the overall trend in PTR has evolved over time. Specifically, PTR has declined since the economic crisis years, driven by reductions in both MST and BST components, reflecting decreases in migration flows as well as total births.

By contrast, Figure 3 reveals substantial disparities across Spanish regions in the PTR, alongside significant changes over time. The Community of Madrid, the Mediterranean and coastal regions recorded the greatest population change alongside with some inland regions. However, these regions were characterised by two opposite population change patterns: (i) the inland regions (Castilla y León, Castilla-La Mancha, and Aragón) experienced a negative migration balance (mainly internal), with Madrid as main destination, which also contributed to a greater population change (PTR), and (ii) the Mediterranean coastal areas (Catalonia, the Valencian Community, Murcia, and the Balearic Islands) and Madrid registered a significant positive migration balance (both internally and internationally), which contributed to a higher PTR. The pattern has remained largely consistent over time, except for the most recent period (2020-2021) affected by the COVID-19 crisis, which generally reduced mobility both internationally and between regions. Notably, this period saw an inverse migration flow, with individuals relocating from Madrid and Catalonia to the inland regions (Castilla y León, Castilla-La Mancha, and Aragón).

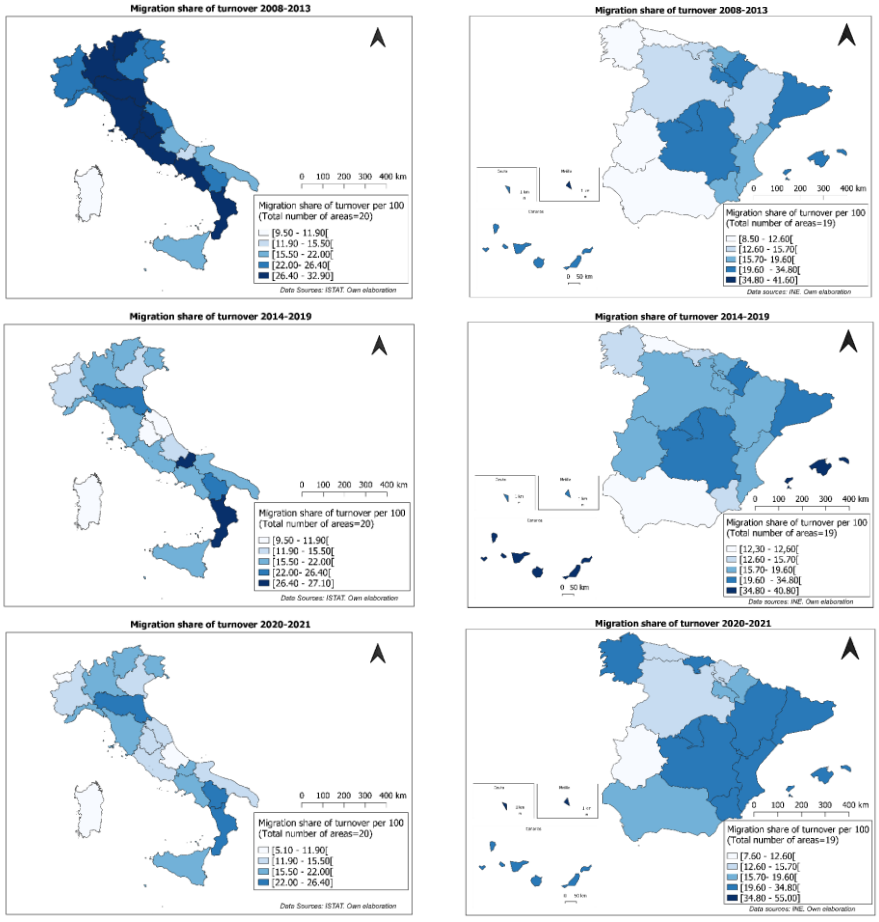
Figure 3 – *PTR in Italy and Spain across regions, 2008-2013, 2014-2019 and 2020-2021.*



Finally, Figure 4 captures the changes in the MST across both Italian and Spanish NUTS-2 regions during the Great Recession (2008-2013), post-crisis recovery (2014-2015) and COVID-19 pandemic (2020-2021) periods. In Italy, the patterns and trends observed in the MST closely mirror those of the PTR. The MST reflects the combined effect of incoming and outgoing flows resulting from both internal and international migration: northern and central regions attract migrants from abroad and from other regions while southern regions experience population losses

primarily due to internal outflows. For instance, in regions such as Calabria and Molise, the MST is influenced by both arrivals and departures.

Figure 4 – *MST in Italy and Spain across regions, 2008-2013, 2014-2019 and 2020-2021.*



In Spain, the pattern is again very similar to that of the PTR, i.e., the MST trends are driven by both the internal and international migratory balances (specifically, the combination of internal migration flows towards Madrid from inland regions, coupled with the arrival of foreign migrants to Madrid, Catalonia and the coastal areas). Notably, these trends also reverse over time depending on the period considered. The highest mobility rates are recorded in Madrid and certain bordering inland areas of Spain, and the Mediterranean regions (Catalonia, the Valencian

Community, Murcia, and the Balearic Islands). The inland regions, primarily those neighbouring Madrid (Extremadura, Castilla y León, and Castilla-La Mancha), are the ones with the largest population drops due to internal migration. Furthermore, following the financial crisis, internal emigration to Madrid increased markedly, while immigrant arrivals from abroad concentrated predominantly in Madrid, Catalonia, the Mediterranean coast, and the islands. The primary destinations attracting foreign individuals include Madrid (internal and international), Catalonia (mainly due to international migration), the Mediterranean coast (Valencian Community and Murcia, due to international migration), and the Balearic and Canary Islands (international migration).

Related to the evolution over time, mobility patterns shifted somewhat during the most recent period, 2020-2021. In this regard, alongside the Mediterranean areas and Madrid and its surroundings, Aragón (with Zaragoza as the epicenter) and the coastal communities of Cantabria and Galicia gained prominence. This shift is largely attributed to return migration from other regions during the COVID-19 lockdown. However, distinct patterns emerge, such as in the region of Galicia. In recent years, Galicia has benefited from its large diaspora of people of Galician origin living abroad, for example, in Cuba and Venezuela. This case is somewhat unusual, as Galicia was historically a major area of emigration during the mid- to late 20th century. Consequently, a positive international migration balance has been observed in certain years due to return migration and the arrival of second- and third-generation descendants of earlier emigrants primarily from Latin America. This trend has been particularly evident during periods of favourable economic conditions in Spain, notably since 2015, following the recovery from the Great Recession. Moreover, at the same time, this region does not exhibit a significant negative internal balance, likely because fewer Spanish nationals emigrate from this region to Madrid compared to other inland regions such as Extremadura and Castilla y León.

5. Conclusion

To conclude, we highlight the following main findings of temporal and spatial regional variability in population change patterns in Italy and Spain. Regarding the temporal evolution of the PTR, MST and BST indicators (RQ1), the results indicate a general decline in overall population change in both Italy and Spain, albeit with different underlying dynamics. In Italy, the decrease in the PTR is primarily driven by a falling trend in migration flows combined with a contraction in the number of births. Conversely, in Spain, while the PTR also shows a slight reduction, this is mainly attributable to a consistent decline in the number of births across all regions, despite a modest increase in migration flows. This decline in births and fertility rates, which has contributed to lower PTR and BST values, has been driven by persistently high youth unemployment, delayed access to stable jobs, growing labour market

instability, and changing career aspirations among young women. Notably, Spain experienced negative international migration balances between 2008 and 2013, followed by a positive shift in subsequent years, further influencing the observed trends. In terms of spatial variability and regional patterns of population change (RQ2), two distinct geographic patterns were observed in both countries, related to the different levels of the PTR and MST. In Italy, the traditional North-Center versus South divide emerges, reflecting persistent socio-economic disparities and internal heterogeneity within macro-regions. In Spain, the contrast appears between inland regions and the more dynamic areas of Madrid and the Mediterranean coast. These findings confirm not only the enduring regional disparities in Italy but also the clear inland-coastal differentiation in Spain, particularly the divergence between Madrid and surrounding inland regions versus coastal areas, underscoring the importance of regional contexts in shaping demographic dynamics. These regional disparities appear to stem from unequal economic conditions across territories, including the concentration of employment opportunities and access to services.

Acknowledgements

This contribution is part of the PRIN 2022-PNRR research project "Foreign population and territory: integration processes, demographic imbalances, challenges and opportunities for the social and economic sustainability of the different local contexts (For.Pop.Ter)" [P2022 WNLM7], Funded by European Union—Next Generation EU, component M4C2, Investment 1.1. We acknowledge also Next Generation EU in the context of the National Recovery and Resilience Plan, Investment PE8 – Project Age-It: "Ageing Well in an Ageing Society" [DM 1557 11.10.2022]. This work was also supported by the research project PID2021-123875NB-I00, funded by the Spanish Ministry of Science and Innovation.

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