



International migration, ageing, and growth in rural Spanish provinces: A roadmap for policymakers?

Rosella Nicolini^{1,*}, José Luis Roig²

Departament d'Economia Aplicada, Universitat Autònoma de Barcelona, Campus UAB, Bellaterra, Barcelona, Edifici B 08193, Spain

ARTICLE INFO

JEL classification:

F22
J11
R11

Keywords:

Immigration
Growth
Province
Rural area
Urban area

ABSTRACT

The aim of our research is to provide additional evidence of international migration's impact on economic growth in regions with ageing populations, namely by analysing the impact on rural versus urban areas in Spain. With Spanish provinces categorised as predominantly urban, predominantly rural and intermediate, our analysis considers data at the provincial level (i.e. NUTS 3) from 2000 to 2019 and follows a convergence-style approach. Our estimations suggest that, overall, population ageing does not negatively impact the GDP per capita growth rate for any type of province (i.e. rural, urban and intermediate) but that rural provinces benefit far more than urban ones from international migration as a driver of growth.

1. Introduction

Population ageing in developed societies is becoming a significant concern for future economic growth. By progressively reducing the share of working-age individuals, population ageing limits opportunities for economic growth in regions experiencing ageing. The added consequences of the demographic dividend of such ageing are often discussed as well, for as older adults and children consume more than they produce, the need for intergenerational transfers and public services such as pensions and healthcare increases (Natale et al., 2024). Those tangible concerns and challenges have to be addressed by societies worldwide, for they are closely linked to the United Nations' Sustainable Development Goal 3, which emphasises ensuring well-being and healthy lives at all ages, as well as Sustainable Development Goal 8, which focuses on promoting inclusive, sustainable economic growth. Regarding economic growth in particular, the literature hosts an ongoing debate over the potential effects of older adults on economic growth. On that count, Nicolini and Roig Sabaté, 2024, focusing on regions of the European Union (EU), have argued that an ageing society can create dynamics (e. g. job and service opportunities) with the potential to fuel growth in regions experiencing population ageing. According to their results, migration is the key factor in turning ageing into an asset. After all,

migrants are expected to both provide services requested by older adults and fill openings left by retirees in societies experiencing a significant drop in fertility rates, as is the case in several EU regions.

In this article, we aim to provide additional evidence on the potential positive effects of immigrants in regions experiencing population ageing, with special focus on rural areas versus urban ones. The rationale of our aim stems from anecdotal evidence concerning Spain (see Section 3), where the consequences of population ageing are unevenly distributed across the country. In particular, rural areas in Spain have registered a considerable decline in the working-age population compared with urban areas. In rural areas, the share of citizens more than 65 years old exceeds that in urban areas, while the share of (young) natives is progressively shrinking despite increasing in urban territories. Furthermore, those two effects are coupled with less growth in GDP per capita in rural areas versus urban ones.

In view of those circumstances, the literature (see Section 2) suggests that international immigration can be used to help rural provinces to curb such economic contraction. Along those lines, we are interested in understanding whether migration truly fuels economic growth in ageing rural societies. After all, immigrants often compete with natives for certain positions, usually jobs involving unskilled labour, and, as such, are not expected to create synergies with natives in local labour markets,

* Corresponding author.

E-mail addresses: rosella.nicolini@uab.cat (R. Nicolini), josepluis.roig@uab.cat (J.L. Roig).

¹ ORCID: 0000-0002-3331-8926

² ORCID: 0000-0003-2793-4631

which may negatively affect economic growth. Alternatively, immigrants can benefit host economies by specialising in different kinds of work versus natives, thereby creating a complementary effect (Borjas, 1995; Peri and Sparber, 2009).

Such potential complementary and substitution effects of immigrants with respect to natives have a significant territorial component.³ In rural areas, immigrants are often hired for jobs not performed by natives, particularly in the agricultural sector, in which the use of temporal contracts is quite common (Adserá et al., 2023; García Serrano and Hernanz, 2023; Chassamboulli et al., 2024). Across Spain, foreign workers play a key economic role not only in agriculture but also in construction and homecare services. Spanish natives who choose higher education and professional careers often leave essential lower-wage jobs unfilled far more if local entrepreneurs offer temporary jobs, as done in agriculture (Garcés-Mascareñas and Güell, 2021). Referring to data from the Labour Force Survey, Chassamboulli et al. (2024) have provided interesting evidence for Spain for 2005–2018 showing that 42.2 % of immigrants have a high school level of education or less (vs. 39.8 % of natives), whereas 37.7 % of natives have completed tertiary education (vs. 23.1 % of immigrants). In terms of employment, 6.8 % of immigrants work jobs in agriculture (vs. 3.9 % of natives), while 13.12 % of immigrants are employed in construction (vs. 7.9 % of natives). Immigrants mostly enjoy part-time and temporary contracts at rates of 18.6 % and 39.9 %, respectively (vs. 12.3 % and 22.8 % for natives, also respectively).

However, urban areas exhibit a potential mix of substitution and complementary effects, for a structural difference that gives immigration a different economic impact. Although migrants often perform tasks (e.g. childcare, eldercare or housekeeping services) avoided by natives, they may also compete with natives. In fact, again referring to the statistics elaborated by Chassamboulli et al. (2024), the shares of natives and immigrants in the service sector in Spain are rather similar, at 73.3 % and 70.7 %, respectively. Although the difference is not striking, the skills required to fill positions in the service sector are decidedly heterogeneous, especially in terms of level of education, which may differentiate the jobs taken by natives versus immigrants. Also referring to Spain, Lebrusan and Murillo (2019) have argued that the progressive entry of native women in the labour market has created job opportunities for homecare services that are typically filled by immigrants, such that in 2007 the sector had 100,000 native employees versus more than 200,000 foreign ones. In the same vein, in the EU overall from 2005 to 2017, the share of natives in (white-collar) high-skilled occupations was 41.8 % versus 29.6 % for immigrants, whereas the share of natives in (white-collar) low-skilled occupations was 15.8 % versus 19.4 % for immigrants (García-Serrano and Hernanz, 2023).

To propose a quantitative approximation of immigration's impact on rural areas in Spain, we first needed to identify those areas and distinguish them from urban ones. We performed that step by referring to the official criterion approved by the EU (see Section 3) that allows identifying rural, urban and intermediate provinces in Spain. For data, we accessed a data series covering 2000–2019 and thus a complete business cycle, starting with the period of sustained growth characterised by

³ Concerning the complementarity and substitutability of immigrants with respect to natives, evidence for Spain clearly shows that no substitutability exists between immigrants and natives in the long term (Carrasco, 2024). In Appendix B, Table B.1 provides evidence concerning the origin of incoming immigrants in Spain in recent decades. As shown, the greatest percentage of immigrants comes from outside the EU, especially from Latin American countries, while the enlargement of the EU into Eastern European countries has generated a large influx of immigrants from Romania, which has produced a pool of immigrants comparable to that in EU15 countries.

significant immigration inflows in 2000–2007, followed by a deep recession with substantial migration outflows in 2008–2013 and a recovery period in 2013–2019.⁴ Based on a convergence-style framework, our results confirm that population ageing does not harm economic growth outlooks at the provincial level in Spain irrespective of the type of province (i.e. rural, urban or intermediate). Even so, international migration has had differing impacts in the three types of provinces, and only international immigrants entering rural areas appear to support such growth. In this article, we illuminate those results by discussing how public policy can contribute to helping the process of economic growth in areas experiencing population ageing. On that count, Loras-Gimeno et al. (2025) have provided an interesting review of the different categories of public policy (e.g. social, fiscal, sectorial and infrastructure) in which local authorities can act in order to counter the negative socioeconomic effect of depopulation in rural areas. Nevertheless, in light of their review, they conclude that the most effective way to solve the problem is to promote initiatives favouring synergies among the four categories together.

In what follows in this article, we provide an overview of the literature in Section 2 and describe our data and present an exploratory analysis in Section 3. In Section 4, we present the results of estimation, after which we conclude the article in Section 5. Additional results are presented in Appendix A and Appendix B.

2. Literature review

In the past decade, the economic consequences of ageing have been widely discussed. The principal consequence identified is the impact of population ageing on the economic growth outlook of particular regions. In such discussions, a hotly debated issue is how a shrinking labour supply can affect the per capita growth performance in ageing economies (Acemoglu and Restrepo, 2017; Aksoy et al., 2019; Basso and Jimeno, 2021). Various studies conducted at the subnational level, including Maestas et al. (2023) analysis of U.S. states, Daniele et al. (2019) analysis of EU regions and Llorens and Mestres (2020) analysis of regions in Spain, have shown a negative relationship between ageing and per capita growth. At the same time, researchers such as Prenzel and Iammarino (2021) and Nicolini and Roig Sabaté (2024) have found a positive relationship for EU regions in the long term.

The key step towards approximating one effect or the other is to identify tools or factors that can compensate for the shrinking labour supply but still endow an economy with the resources needed to guarantee growth. One such factor is technology, and, along those lines, the question is to what extent automation can compensate for the decline in the labour supply. Acemoglu and Restrepo (2017) have even argued that ageing can be compatible with positive economic growth due to increased productivity resulting from automation. Aksoy et al. (2019), however, found no evidence of a compensation effect.

Another possible factor is human capital, as discussed by Prenzel and Iammarino (2021), given that an economy with workers with higher-level skills than their predecessors (i.e. retirees) can guarantee growth. Under those circumstances, the general improvement in the skills of younger generations entering the labour market seems to improve productivity as well.

Last, economic growth in regions experiencing population ageing can also be stimulated by introducing the entry of (international) immigrants in local labour markets and thereby overcoming the shortage of native workers. That pathway has been investigated by Nicolini, Roig Sabaté (2024), who hypothesised that the factor of migration may explain the positive relationship between population ageing and growth

⁴ A few studies, including Salvati's (2018), have emphasised the need to consider phases of the economic cycle in order to understand changes in demographic patterns at the spatial level. Recognising the same need, in our study we analysed data representing a complete business cycle for Spanish regions.

in EU regions. By estimating a model of GDP per capita convergence across EU regions (i.e. NUTS 2) from 2000 to 2020, they found that migration can reverse the negative effects of population ageing on economic growth. While migrants can replace and fill the vacancies left by ageing workers, they can also bring about a reinstatement effect, in which migrants fill new jobs, primarily in service sectors, that are generated by population ageing in the most affected regions.

Another interesting dimension of population ageing is the geographical one, considering that ageing occurs unevenly across space. Areas experiencing population ageing, especially rural ones, are often associated with depopulation, as exemplified in Latvia (Krisjane et al., 2023) and Sweden (Henning et al., 2023), among others. In Spain, the geographical dimension is similarly relevant. There, the pattern of population ageing is clear, and its effects are particularly pronounced in rural areas, where progressive depopulation has accelerated the ageing of the remaining population.⁵ However, the literature also emphasises the ways in which immigration can achieve demographic and economic benefits. Gutiérrez et al. (2020) have shown, for instance, that rural municipalities in Spain experienced demographic growth between 2002 and 2010, driven primarily by net migration, primarily from abroad but also from within Spain. However, such growth was interrupted by the Great Recession. From 2011–2018, rural areas lost approximately 500,000 inhabitants, for a 3.6 % decrease in the rural population compared with 1997, and the reduction in net flows of international migrants can explain most of those changes.

At the same time, various authors have underscored the importance of international migration inflows in contributing to the demographic resilience of rural areas that are experiencing population ageing. For example, Collantes et al. (2014) for Spain, Backman and Karlsson (2023) for Sweden and Meister et al. (2023) for Germany have all concluded that rural areas and other areas suffering from depopulation benefit significantly from international migration in their efforts to mitigate or reverse population ageing. Even so, it is important to assess whether the same demographic contribution has an economic counterpart in terms of growth. While evidence tends to suggest that rural areas gain a demographic advantage compared with urban and semi-urban areas, they may also derive a differential advantage in terms of growth from the effects of international migration. Migrants in rural areas can expand and rejuvenate the labour force for existing occupations and help to generate and attract new economic activity in rural areas. Migrants can also boost consumption in rural areas. In that context, Lardiés-Bosque and del Olmo-Vicen (2023) have provided evidence of the structural differences in the final waves of foreign immigrants who settled in Spain's rural areas versus previous waves. In the 1970s and 1980s, foreign immigrants settling in rural areas were mostly retirees, whereas new migrants beginning in the 1990s have had a different profile. Indeed, they are searching for jobs, and rural areas offer interesting opportunities in agriculture, construction and, most recently, the service sector.

Considering all the above, the hypothesis (H_1) to be tested in our study focused on the association between immigration and growth:

H_1 . *International immigration can drive economic growth in rural provinces experiencing ageing in their native populations.*

3. Data and descriptive statistics

To conduct our analysis, we built an original dataset merging

⁵ Concerning the urban-versus-rural dimension, a clear underlying hypothesis for the uneven spatial distribution of the population is that urban areas are usually more attractive to people than rural ones for professional, personal and lifestyle-based reasons. Thus, the challenge for revitalising rural places is to make them appealing. The theoretical framework proposed by Muroishi and Yakita (2022) effectively summarises the urban-versus-rural dichotomy and its consequences.

multiple sources of data representing 50 Spanish provinces from 2000 to 2019.⁶ Data on GDP per capita for Spanish provinces (*GDP per capita*) were taken from the online statistics provided by La Caixa.⁷ Provincial-level demographic data on the share of the population older than 65 years (*share Pop >65*), the share of immigrants (*share of immigrants*) and the median age (*median age*) were extracted from administrative data (*Padrón*) made available by the Instituto Nacional de Estadística (INE, Spain). In addition, we included data on the share of employees in the construction sector relative to the total number of employees in a selected province (*share construction*) from the IVIE database on human capital.⁸ The rationale for including the construction sector was to take into account the key role of this sector for the growth and recession of the Spanish economy in the 2000s and 2010s.⁹

To identify urban versus rural provinces, we adopted the categorization introduced by the EU (2019/1130, 2 July 2019). Per that categorization, the Spanish territory is split into 1 km-grid squares, and the following categories are:

- 1) *Mostly rural province*: At least 50 % of the population lives in rural grid cells (labelled “1”);
- 2) *Intermediate province*: More than 50 % but less than 80 % of the population lives in urban agglomerations (labelled “2”); and
- 3) *Mostly urban province*: At least 80 % of the population lives in urban agglomerations (labelled “3”).

Applying that definition, we identified eight mostly rural provinces, 14 mostly urban provinces and 28 intermediate provinces in Spain. Fig. 1 displays the spatial distribution of the three types of provinces.

Fig. 1 shows that the distribution of urban, rural and intermediate provinces in Spain does not follow a clear spatial pattern. Most rural areas are concentrated around the urban province of Madrid, while urban provinces are located in the south-eastern side of the country. There are eight mostly rural provinces—Ávila, Cuenca, Lugo, Ourense, Segovia, Soria, Teruel and Zamora—and 14 mostly urban provinces—Alicante, Álava, Barcelona, Cádiz, Córdoba, Islas Baleares, Las Palmas, Madrid, Málaga, Murcia, Santa Cruz de Tenerife, Segovia, Sevilla and Zaragoza.¹⁰ More information about the structure and composition of those areas can be inferred from descriptive statistics.

Table 1 presents a few descriptive statistics for the most relevant variables in our database, organised by type of area. Rural provinces have been the most affected by demographic change in Spain; they have the highest median age and, consequently, the largest share of the population older than 65 years and the lowest share of young natives in the working-age cohort (i.e. 15–34 years old). The dependency rate is by far the highest in the rural areas, and the difference compared with the other two types of areas has been driven by both population ageing in rural areas and the migration of working-age people from rural to urban

⁶ We excluded Ceuta and Melilla from the sample.

⁷ <https://www.observatoriofp.com/datos-interactivos/datasets/pib-diferentes-indicadores-ccaaprovincias>

⁸ Fundación Bancaja e Ivie (Instituto Valenciano de Investigaciones Económicas). Capital humano en España y su distribución provincial. València, January 2014. Based on data available at <http://www.ivie.es/es/banco/caphum/series.php> [last access: May 2024]. The human capital database covers 1967–2013. While we were able to include such information in the convergence-type equation, we were unable to include it in the panel analysis in Table A.1.

⁹ The EU reports *European Construction Sector Observatory – Country profile Spain* (European Commission, 2018; European Commission, 2022) provide precise data and evidence of the sector's role in the Spanish economy and the corresponding changes experienced from 2000 to 2020.

¹⁰ In the Appendix, Figure A.1 and Table A.1 provide a complete list of the typology of the provinces of Spain.

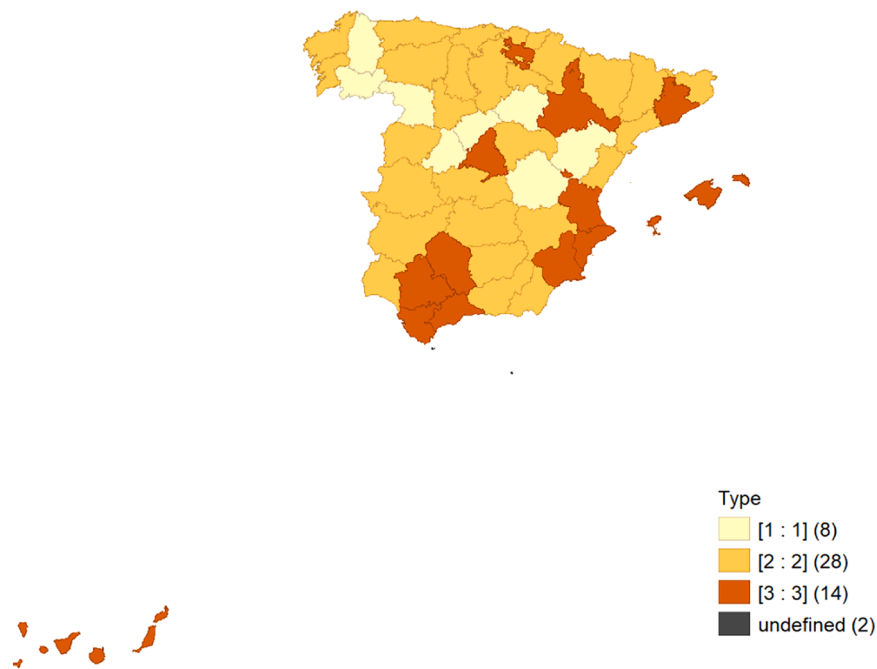


Fig. 1. Typology of provinces in Spain.

Table 1

Descriptive statistics. (Source: INE; calculations: Authors).

2000					2019				
Mostly rural provinces									
Variables	Obs	Mean	Std. dev	Min	Max	Mean	Std. dev.	Min	Max
Share Pop (>65)	8	26.11	13.78	23.43	27.29	26.64	3.40	22.66	31.38
Dependency rate	8	64.05	2.61	59.67	68.00	63.72	5.22	57.58	72.13
Median age	8	44.53	1.26	42.76	46.05	48.09	2.08	45.85	50.80
Share of immigrants	8	0.85	0.47	0.47	1.92	7.32	3.09	3.35	11.01
GDP per-capita (€)	8	13392	2325	11146	16696	23386	2503	20370	28181
Share natives 15–34	8	0.43	0.2	0.18	0.75	0.37	0.15	0.17	0.60
Intermediate provinces									
Variables	Obs	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max
Share Pop (>65)	28	19.07	2.51	13.74	24.08	21.06	3.17	14.73	27.04
Dependency rate	28	52.14	5.05	43.35	59.56	56.17	3.68	49.25	63.27
Median age	28	40.61	1.92	36.13	43.72	44.55	2.30	40.09	48.97
Share of immigrants	28	1.37	1.24	0.32	6.18	8.38	5.24	2.43	20.35
GDP per-capita (€)	28	14940	3330	10114	20322	24944	4772	17728	34285
Share natives 15–34	28	1.33	0.66	0.38	2.76	1.27	0.56	0.32	2.29
Mostly urban provinces									
Variable	Obs	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max
Share Pop (>65)	14	14.91	2.38	10.44	20.00	17.82	1.98	14.97	21.12
Dependency rate	14	46.38	3.84	40.39	55.37	51.64	4.45	42.12	57.84
Median age	14	38.17	1.82	35.35	41.79	42.53	1.17	40.51	44.45
Share of immigrants	14	3.06	2.48	0.32	8.23	11.45	5.14	2.70	19.12
GDP per-capita (€)	14	15745	3744	10714	22101	24958	6816	18003	38997
Share natives 15–34	14	4.24	3.65	0.72	13.18	4.40	3.70	0.62	13.93

provinces.¹¹ Additionally, our statistics highlight a significant increase in the share of immigrants from 2000 to 2019, particularly in urban provinces, where immigrants form approximately 10 % of the total population. The urban areas are generally more attractive to immigrants than rural ones because of their higher likelihood of hosting ethnic enclaves and/or networks that guarantee tangible support to incoming immigrants and provide proper contacts to find jobs (Maani, 2016; Serrano-Domingo et al., 2020; Stuart and Taylor, 2021). According to Fig. 2, urban areas also have the highest population density. Last, the

high concentration of older individuals in rural areas, excluding most tourist-oriented destinations, suggests that the international migration of older adults to southern destinations likely does not significantly contribute to the economic development of those provinces.¹²

Because our objective was to detect the possible contribution of international migration to local economic growth, our chief interest was working-age immigrants so that we could gather evidence from that perspective.

¹¹ The dependency rate is defined as the ratio of the population younger than 15 years old and older than 65 years to the working-age population.

¹² A discussion of the tendency of younger elderly retired individuals to move to areas rich in natural amenities and the potential spatial consequences can be found in Newbold (2015).

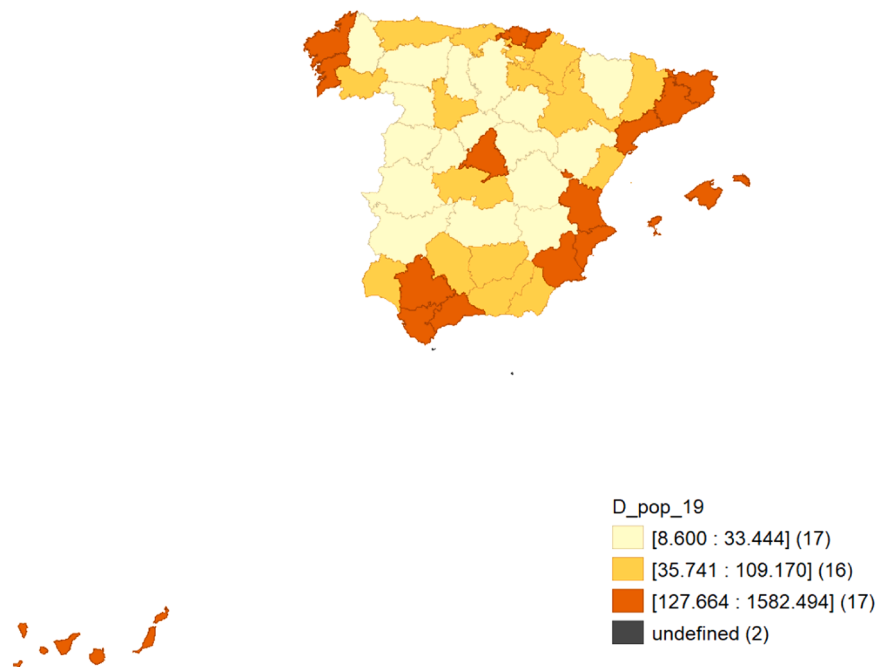


Fig. 2. Population density in Spain, 2019.

We begin by presenting, in Table 2, statistics on the relative share of employed immigrants among the total number of employees in each of the three identified types of areas (i.e. urban, rural and intermediate). Over the entire period, non-EU employee immigrants were more concentrated in urban areas, whereas EU immigrants were more concentrated in rural areas. Moreover, to assess whether rural or urban areas shared similar or different patterns of specialisation in terms of the employment of natives, EU and non-EU immigrants, we computed Krugman Specialisation Index (KSI; Krugman, 1981) values between immigrants and natives (Table 3). Our framework considers the classification of provinces as rural, intermediate, and urban. In this context, the KSI measures the degree of dissimilarity in the employment of migrants (of province-type) by sector (s) compared to natives (n) in the same province-type h at time t . This relative measure allows us to assess whether one type of province exhibited a higher concentration of a specific category of migrants compared to natives, indicating a higher degree of specialization for a particular group of migrants in a sector. When referring to sectors, we are using the full NACE4 classification (21 sectors of activity). The KSI is calculated as follows:

$$KSI_{hmt} = \frac{1}{2} \sum_s \left(\frac{X_{shmt}}{X_{hmt}} - \frac{Z_{shmt}}{Z_{hmt}} \right) \quad (1)$$

where X_{shmt} is the employment of migrant of origin m in sector s , in the type of province h , at time t . X_{hmt} is the total employment of migrants of origin m in type of province h (at time t). Z_{shmt} is the employment of natives, n , in sector s , in type of province h at time t . Finally, Z_{hmt} is the total employment of natives in type of province h at time t .

The value of the KSI ranges from 0 to 1, with 0 indicating an identical

Table 2

Share of employed immigrants among total employees (%). (Source: Social Security Registry data files; calculations: Authors).

	EU			Non - EU		
	2012	2015	2019	2012	2015	2019
<i>Rural</i>	3.65	3.74	4.37	3.09	2.47	3.44
<i>Intermediate</i>	2.68	2.75	3.15	3.48	2.92	4.02
<i>Urban</i>	3.48	3.70	4.37	6.03	4.97	6.31

Table 3

Krugman Specialisation Index (KSI). (Source: Social Security Register data files; calculations: Authors).

	EU Migrants vs Natives			Non-EU Migrants vs Natives		
	2012	2015	2019	2012	2015	2019
<i>Rural</i>	0.351	0.348	0.347	0.314	0.307	0.320
<i>Intermediate</i>	0.281	0.275	0.268	0.273	0.269	0.265
<i>Urban</i>	0.242	0.229	0.222	0.295	0.295	0.281

distribution of employment for migrants and natives by sector, and 1 representing a completely dissimilar distribution of employment between migrants and natives by sector. We calculate the KSI for the years 2012, 2015, and 2019 to obtain a measure of the degree of complementarity or substitutability for jobs filled by immigrants versus natives.

The results are presented in Table 3.

Our results show that there is a degree of substitutability between migrants and natives is lower in rural provinces than in the other two types of provinces. The results in Table 3 emphasise that the degree of specialisation of immigrants both from EU and non-EU countries in rural provinces in Spain during the period was relatively higher than in urban and intermediate provinces. In the light of Lardiés-Bosque and del Olmo-Vicen's (2023) discussion and knowing that recent waves of immigrants were mostly immigrating for work, the results can be examined in relation to the (territorial) availability of job opportunities and a lower degree of substitutability between migrants and natives to fill those positions. Evidence discussed in Section 1 endorses that hypothesis. Furthermore, according to the statistics provided by the Regional Information Centre for Western Europe – United Nations,¹³ in 2022 non-EU workers were more present in some sectors than EU workers, namely hotels and restaurants (i.e. 9.1 % vs. 4.2 % for EU workers), logistics and distribution (i.e. 7.6 % vs. 3.9 %) and domestic work (i.e. 5.9 % vs. 0.7 %). Because most of those activities are concentrated in urban areas, those statistics help to explain the higher KSI values in urban areas for non-EU migrants than for EU migrants.

At the same time, as also shown in Table 1, when referring to the

¹³ <https://unric.org/en/migration-to-the-eu-facts-not-perceptions/>

general measure of GDP per capita (in real terms, pps), the value in urban provinces was higher than in the others—urban and intermediate provinces were nearly at the same level—which aligns with typical patterns of urban economic performance.

Fig. 3 presents a map of the average annual growth rate of Spanish provinces between 2000 and 2019. The spatial pattern shows that rural and intermediate provinces, identified in Fig. 1, registered higher growth rates than urban provinces. However, those provinces also had a higher proportion of aged individuals and a lower concentration of immigrants than urban areas. That result raises an important question: How can areas experiencing population ageing, which also experience a loss of working-age individuals (see Table 1) and, consequently, productive resources, maintain valuable assets to ensure not only positive growth rates but also rates higher than those of urban provinces, which continuously attract productive resources?

The potential existence of a positive, statistically significant association between growth, immigration and older adults can be deduced using the B-Lisa map in Fig. 4.¹⁴ The map confirms the existence of a moderate statistical association between the average annual growth rate in 2000–2019 and the share of aged individuals in 2000, whose spatial distribution became more consolidated over time, in a few Spanish provinces, primarily those identified as being mostly rural, which aligns with H_1 . Therefore, more conclusive quantitative evidence is needed to better disentangle the impact of immigration on growth rates in provinces exhibiting a higher share of people more than 65 years old.

4. Empirical analysis

To conduct our empirical analysis and approximate the possible association between provincial ageing, share of foreign immigration and growth rates, we adopt a convergence-style econometric approach. Our analytical framework followed a conditional beta convergence method; thus, our dependent variable was the average annual growth rate for each selected spatial unit, with the values of selected determinants at the initial time point of our analysis (i.e. 2000). This approach is quite commonly reported in the literature because it allows researchers to control for potential endogeneity due to the simultaneous effect between the dependent variable and selected covariates (e.g. Bisciari et al., 2020; Llorens i Jimeno and Mestres Domènech, 2020; Monfort, 2020; Maestas et al., 2023).

From a spatial perspective, we considered 50 Spanish provinces while excluding Ceuta and Melilla from our analysis.¹⁵ For each spatial unit (i.e. *province*) s , our baseline estimation was:

$$\begin{aligned} \text{Av growth rate GDPpc}_{s,2000-19} = & \beta_0 + \beta_1 \text{LogGDPpc}_{s,2000} \\ & + \beta_2 \text{Log Median age}_{s,2000} \\ & + \beta_3 \text{LogPop}(> 65)_{s, 2000} \\ & + \beta_4 \text{Log Share immigrants}_{s, 2000} \\ & + \varepsilon_s \end{aligned} \quad (2)$$

Depending on the possible existence of an economic convergence process across Spanish provinces ($\beta_1 < 0$), the estimation of Eq. (2) allows disentangling how immigration (β_4) and ageing (β_2 or β_3 alternatively) can impact on the annual growth rate of provinces. Positive estimates for β_2 or β_3 and β_4 show that the share of immigrants and share of older adults is positively associated with the annual growth rate. As discussed by Nicolini, Roig Sabaté (2024), older adults create the need for new services (e.g. homecare and healthcare services) and can thus

contribute to economic growth. In the same way, immigrants who fill jobs are productive for the host provinces and thus also contribute to the growth process. When that dynamic is translated to the Spanish setting, the catching-up process has concerned rural versus urban provinces, the latter of which have had higher income levels, while rural provinces have registered an important ageing process jointly with a low share of foreign immigrants. Therefore, the crucial question is whether the small number of immigrants in rural provinces can effectively contribute to the growth process of those provinces.

Estimation results for Eq. (2) appear in Table 4. The table is organised in five columns; the principal difference between columns 1–3 and columns 4 and 5 is that columns 1–3 approximate ageing at the province level with the share of population aged more than 65 years, whereas columns 4 and 5 approximate it with average age at the provincial level. Added to columns 1 and 4, we introduced the aggregate variable that refers to the total share of immigrants per province while taking into consideration rural, urban and intermediate provinces jointly; in columns 2, 3 and 5, by contrast, we broke down the value of the total share of immigrants with the value of the share of immigrants for the three types of provinces (i.e. rural, urban and intermediate). That is, we interacted the variable share of migrants with the dummy variables for the province-types, in order to capture differential effects of migration in each of those group.¹⁶

The preliminary step prior to estimations was to compute the variance inflation factor statistics (VIF) in order to confirm that our specifications did not suffer from evident multicollinearity problems, which we in fact confirmed. Overall, our estimations confirmed the persistence of the convergence process for 2000–2019, as rural provinces registered an average annual growth rate of 0.56, whereas the growth rate in urban provinces was approximately 0.45 during the same period. However, as shown in Table 1, the provinces growing at the fastest pace were also those experiencing significant population ageing. In that sense, our first consistent, robust result was the positive association between the two proxies of population ageing, $\text{Log Pop}(>65)_{2000}$ and $\text{Log Median Age}_{2000}$, which were positively associated with the average annual growth rate of each province.¹⁷ Regarding migration, the aggregate effect of the total share of migrants on GDP growth prompted two distinct effects; in rural provinces, the influx of international immigrants fuelled growth, whereas in urban and intermediate provinces the effect was the opposite, which supported H_1 .¹⁸ Moreover, the effect was reinforced when we controlled for the relative importance of the construction sector (*Share construction*), which is associated with business cycle fluctuations in several Spanish provinces.

As discussed in Section 1, a possible mechanism that might have driven that result is the possibility that incoming migrants in rural areas perform services and/or activities that involve either new types of tasks (i.e. primarily associated with the healthcare of aged individuals) or filled positions previously held by now-retired natives. The results of our estimations support that hypothesis. Overall, the impact of the share of immigration on the average annual growth is negative. However, the results formed a composition effect; in rural provinces, the influx of international immigrants stimulated growth, whereas in urban and intermediary provinces, which host the majority of incoming immigrants, the effect is negative. The negative effect in urban and intermediary provinces likely relates to the potential substitution effects with

¹⁴ The B-Lisa statistics capture the relationship between the value for one variable in a location (e.g. province) s and the average neighbouring values for another variable (Anselin, 2017).

¹⁵ A map of the Spanish provinces is included in the Appendix.

¹⁶ In our empirical strategy, we opted to avoid the correction of error by clustering per region (*comunidad autónoma*): the migration policy is set at the national level.

¹⁷ The R^2 , AIC and BIC statistics provide an assessment of the quality of the estimations.

¹⁸ In Table A.1 in the Appendix, we perform a similar exercise by exploiting the panel version of these data. Once more, the data confirm the positive impact of the presence of migrants in rural areas, whereas that impact turns out to be negative in the case of urban areas.

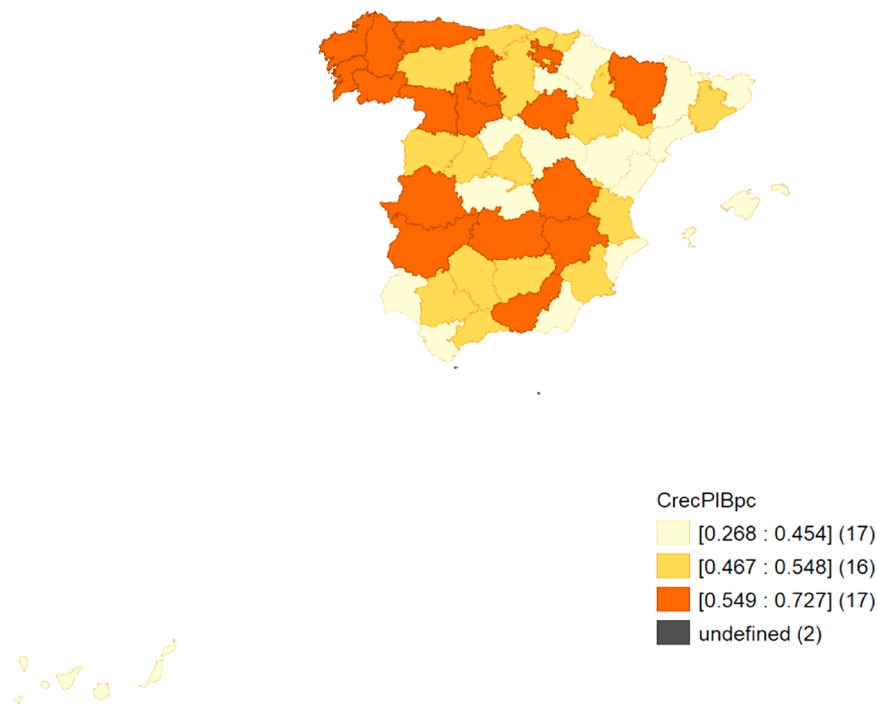


Fig. 3. Average annual GDP growth across Spain, 2000–2019 (%).

natives and to the demographic composition of the migrant flows. Urban areas may attract more immigrants in terms of population (e.g. due to family reunification), but those immigrants are not always active in the labour market.¹⁹

5. Conclusion and policy considerations

Beyond confirming the existence of a growth convergence process, our empirical analysis revealed that population ageing in Spanish provinces between 2000 and 2019, approximated by the change in the share of the population more than 65 years old, did not harm the growth rate of GDP per capita but instead produced a positive, statistically significant effect on the average annual growth rate. Furthermore, the effect appears to have been reinforced by the entry of immigrants, which rural provinces benefited from much more than urban ones, although population ageing in urban areas seems to have attracted more immigrants. Those results implicitly emphasise that having more immigrants does not always translate into a productive asset in terms of GDP: however, only by analysing the distribution of immigrants by type of territory (i.e. urban, rural and intermediate provinces) can we identify that the positive effect of immigration on the growth rate was exclusive to rural provinces.

A possible rationale for interpreting the effect aligns with reinforcing the extensive margin effect brought about by the entry of immigrants. In Spain, rural provinces have experienced a significant loss of young local (native) residents who are mostly drawn to career and life opportunities in urban areas, which instead has increased the share of natives 15–34 years old according to the evidence provided in Table 1. The entry of

immigrants into those regions has helped to sustain or revitalise productive activities, thereby creating a new dynamic for productive activities there. Examples of such action include the INTEGRA initiative of the Unión de Agricultores y Ganaderos and the general framework of an initiative to integrate immigrants in the rural provinces in Aragón (Law 13/2023, 30 March, BOE-A-2023-10878). In addition, some ad hoc programmes implemented in rural provinces in Spain—the so-called Spanish *Lapponia* that offer job positions to immigrants—may help incoming immigrants to escape the “informality trap” often associated with home or healthcare services, particularly in urban provinces, whose principles of action are discussed in Loras-Gimeno et al. (2025).

A general framework of action to revitalise urban areas is described by the Rural Observatory of the EU.²⁰ Some flagship initiatives supported by the EU also involve the implementation of initiatives designed to fuel growth in rural regions in the framework of the circular economy, particularly in the exploitation of natural resources. In that framework, various initiatives in Spain that have been implemented in the provinces of Lugo, Segovia and Teruel go beyond reinforcing tourism activity by also involving new technology.²¹ For instance, a project in the province of Segovia has involved the adoption of drones to supply services to agriculture. Other, more canonical initiatives have adopted a scope in which local services are provided to rural communities—for example, local bricolage and artisanal activities in rural areas in Segovia. Another line of action has been fiscal policies that afford subsidies to settle in rural villages and start productive activities there, as in the case of the LEADER programme for rural areas in Aragón (e.g. Teruel). Beyond that, families are eligible for monetary grants if they move to a rural location (i.e. village with less than 20,000 inhabitants), and a similar policy has been launched in the rural province of Castilla-y-León (law ORDEN FAM/538/2024 published in the Boletín Oficial de Castilla y León n. 111, 10 June 2024).

In our study, we additionally identify a close spatial association

¹⁹ For a robustness test, we approximate the quantitative effect of ageing and immigration on the average growth in ageing (see Appendix) while continuing to adopt a beta-convergence approach (Table A.2). The second set of estimations in the Appendix confirms that ageing has been a widespread process across Spanish provinces over time has not exacerbated an already existing process in selected provinces. In terms of migration, only a minor negative effect is observed for intermediary provinces, confirming the lack of complementarity between immigrants and natives in these areas.

²⁰ Accessible at: <https://observatory.rural-vision.europa.eu/?lng=en&ctx=RUROBS>

²¹ Information can be found by browsing the webpage HOLAPUEBLO (<https://holapueblo.com/>).

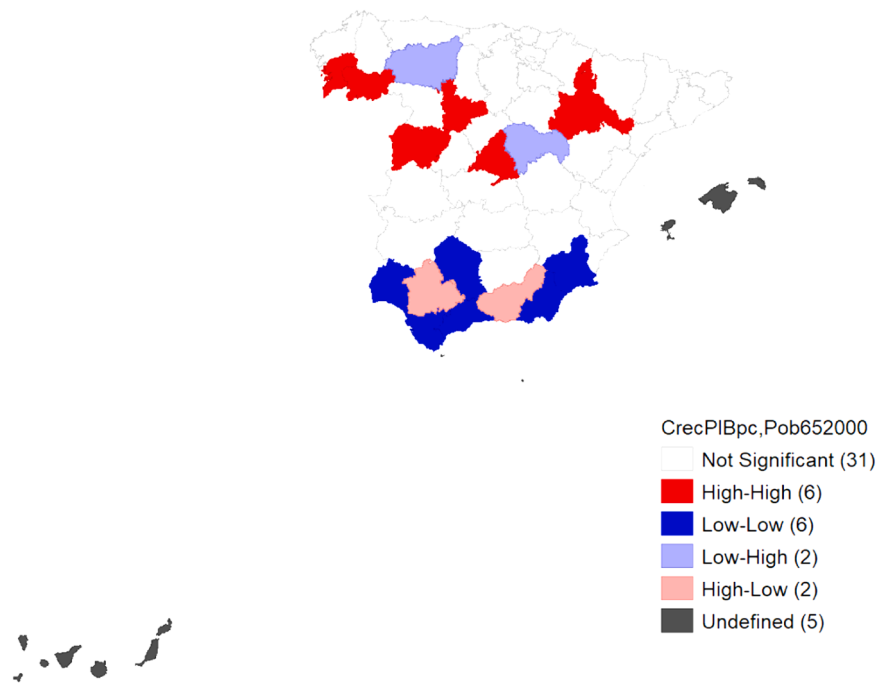


Fig. 4. Clustering analysis of growth and the population aged 65 years and older in Spanish provinces, 2000.

Table 4

Estimations dependent variable: average annual growth rate GDP per capita, 2000–2019.

	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Constant	1.17* (0.62)	0.92 (0.62)	1.98*** (0.67)	−0.37 (0.68)	0.09 (0.76)
Log GDP-pc ₂₀₀₀	−0.11 (0.07)	−0.10 (0.09)	−0.17*** (0.07)	−0.15** (0.07)	−0.20*** (0.06)
Log Pop(>65) ₂₀₀₀	0.14** (0.06)	0.17*** (0.13)	0.20*** (0.05)		
Log Median Age ₂₀₀₀				0.61*** (0.18)	0.73** (0.12)
Log Share Immig ₂₀₀₀	−0.04** (0.02)			−0.04** (0.01)	
Log Share Immig Rural ₂₀₀₀		0.09 (0.05)	0.09* (0.05)		0.08** (0.04)
Log Share Immig Urban ₂₀₀₀		−0.04** (0.02)	−0.03 (0.02)		−0.03 (0.02)
Log Share Immig Interm ₂₀₀₀		−0.06*** (0.02)	−0.04* (0.02)		−0.03* (0.02)
Log Share construction			−0.16*** (0.06)		−0.15** (0.06)
Mean VIF	1.32	1.27	1.44	1.34	1.41
Obs	50	50	50	50	50
R-squared	0.46	0.52	0.58	0.52	0.63
AIC	−109.75	−111.78	−117.08	−115.65	−122.38
BIC	−102.10	−100.31	−103.70	−108.00	−108.99

Level of significance: *** 1 %, ** 5 %, * 10 %. Standard errors are shown in brackets.

Error correction: Robust

between ageing and depopulation in Spanish provinces; hence the implementation of policies tackling depopulation seem to have implicitly provided initiatives to control for negative economic externalities due to ageing. However, our framework of analysis underscores the importance of developing sustainable initiatives to counter the negative economic effects of ageing on economic growth. The need to implement policies as tools to fuel a process of long-term sustainable growth at the local level also stresses the importance of pondering the type and sequence of initiatives to be supported and their targets. The economic

growth process additionally calls for privileging productive activities or assets. Fiscal policies (e.g. tax cuts and subsidies to afford access to real estate properties) can be very effective in making rural (and ageing) areas attractive to the working-age population, including immigrants, and/or in generating productive activities in the short term; however, they cannot be the exclusive channel for public intervention. Fiscal policies should be planned to enhance sectorial policies with the aim to push the rise of entrepreneurial activities in service sectors (e.g. energy and tourism) as well as social services (e.g. healthcare services) in rural areas to help those locations to overcome economic decline. Given the previous circumstances and to target long-term economic growth, it is important to complement those initiatives with additional actions in order to consolidate the location of new incoming activities within host sites. That role is expected to be played by tailored policies that support the creation of material or digital infrastructures able to provide the locations with productive assets to make the local environment attractive and productive.

Of course, more precise quantitative results would help to not only clarify the size of the effect of the synergies among different policies but also to tailor additional place-based policies. To that end, a more detailed analysis of the mobility patterns of both native and international individuals at finer geographical levels, including municipalities, would provide a clearer picture of the push and pull factors affecting each group and, in turn, determining the attractiveness of selected places, including rural areas. Doing so would help to identify the most suitable conditions to enhance the professional complementarity between groups of citizens in different territories, which is likely to support economic growth across the provinces of Spain.

CRedit authorship contribution statement

Rosella Nicolini: Writing – review & editing, Methodology, Formal analysis, Conceptualization. **José Luis Roig:** Writing – review & editing, Methodology, Formal analysis, Conceptualization.

Declaration of Competing Interest

All authors contributed to the study conception and design, data

collection, data analysis and writing of the manuscript. All authors read and approved the final manuscript.

There are not conflict of interest.

Acknowledgements

We are grateful to Jean-Paul Carrière, Bruce Newbold, Amanda

Weinstein, Editor-in-Chief Andrea Caragliu, anonymous reviewers and participants at the International Geographic Seminar Dimitrie Cantemir 2024 and NARSC 2024 for their useful comments and suggestions. Our research benefited from financial support provided by the Ministerio de Ciencia e Innovación (PID2021-124713OB-I00 and 2021SGR00189). All errors in the article are our responsibility.

Appendix A



Figure A.1. Spanish provinces

Authors: E. Gómez-Fernández; Javi C.S and D. Mol (2021); Creative Commons License CC BY-SA 3.0

Table A.1

Provinces and Typology

Provinces	Typology	Provinces	Typology
Albacete	Intermediate (Code 2)	Lugo	Rural (Code 1)
Alicante	Urban (Code 3)	Madrid	Urban (Code 3)
Almería	Intermediate (Code 2)	Málaga	Urban (Code 3)
Álava	Urban (Code 3)	Murcia	Urban (Code 3)
Asturias	Intermediate (Code 2)	Navarra	Intermediate (Code 2)
Ávila	Rural (Code 1)	Ourense	Rural (Code 1)
Badajoz	Intermediate (Code 2)	Palencia	Intermediate (Code 2)
Illes Balears	Urban (Code 3)	Las Palmas	Urban (Code 3)
Barcelona	Urban (Code 3)	Pontevedra	Intermediate (Code 2)
Bizcaia	Intermediate (Code 2)	La Rioja	Intermediate (Code 2)
Burgos	Intermediate (Code 2)	Salamanca	Intermediate (Code 2)
Cáceres	Intermediate (Code 2)	Santa Cruz de Tenerife	Urban (Code 3)
Cádiz	Urban (Code 3)	Segovia	Rural (Code 1)
Cantabria	Intermediate (Code 2)	Sevilla	Urban (Code 3)
Castellón	Intermediate (Code 2)	Soria	Rural (Code 1)
Ciudad Real	Intermediate (Code 2)	Tarragona	Intermediate (Code 2)
Córdoba	Urban (Code 3)	Teruel	Rural (Code 1)
A Coruña	Intermediate (Code 2)	Toledo	Intermediate (Code 2)
Cuenca	Rural (Code 1)	Valencia	Urban (Code 3)
Guipuzkoa	Intermediate (Code 2)	Valladolid	Intermediate (Code 2)
Girona	Intermediate (Code 2)	Zamora	Rural (Code 1)
Granada	Intermediate (Code 2)	Zaragoza	Urban (Code 3)
Guadalajara	Intermediate (Code 2)	Ceuta	Excluded

(continued on next page)

Table A.1 (continued)

Provinces	Typology	Provinces	Typology
Huelva	Intermediate (Code 2)	Melilla	Excluded
Huesca	Intermediate (Code 2)		
Jaén	Intermediate (Code 2)		
León	Intermediate (Code 2)		
Lleida	Intermediate (Code 2)		

Table A.2

Estimations

Dependent variable: GDP per-capita (in log) (2006–2022)

	FE	FE
Constant	9.95 (0.94)	9.93*** (0.09)
Log Pop(>65) (–5)	–0.024 (0.033)	–0.016 (0.03)
Log Share Immig (–5)	0.034*** (0.007)	0.038*** (0.008)
Rural	–0.059*** (0.011)	–0.109*** (0.018)
Urban	–0.018** (0.009)	0.049*** (0.016)
Rural * Log Share Immig (–5)		0.030*** (0.009)
Urban*Log Share Immig (–5)		–0.037*** (0.008)
<i>F-test</i>	189.19***	199.47***
<i>Time fixed effects</i>	Yes	Yes
<i>Region fixed effects</i>	Yes	Yes
Obs	857	857
R-squared	0.44	0.46
AIC	–1967.91	–2007.34
BIC	–1863.33	–1893.26

Level of significance: *** 1 %, ** 5 %, * 10 %. Standard errors are shown in brackets.
Error correction: Robust

Note: Variables *Rural* and *Urban* are two dummy variables identifying the mostly urban and rural provinces respectively. In order to control for endogeneity effects, the variables *Log Pop(>65)* and *Log Share Immig* are lagged by five periods (The results of the Granger test (available upon request) confirm that one-period lag is not sufficient to control for endogeneity due to the double causality between dependent and independent variables. The test is inconclusive about the number of lags we need to take into account to control for endogeneity and we lag the controls up to 5-periods something that can hold given our sample size and the number of variables included in the estimation). The *F-test* confirms that the Fixed-Effect model is the most preferred one.

Table A.3

Estimations

Dependent variable: Average annual growth rate share of population older than 65 years (2000–2019)

	OLS	OLS	OLS	OLS	OLS
Constant	1.22 (0.63)	0.82 (0.61)	1.63* (0.86)	1.46*** (0.21)	1.39*** (0.24)
Log GDP-pc ₂₀₀₀	–0.005 (0.07)	0.02 (0.07)	–0.04 (0.09)	–0.05** (0.02)	–0.05*** (0.02)
Log Pop(>65) ₂₀₀₀	–0.36*** (0.08)	–0.31*** (0.07)	–0.29*** (0.07)		
Log Median Age ₂₀₀₀				–0.23*** (0.06)	–0.20*** (0.05)
Log Share Immig ₂₀₀₀	–0.04 (0.02)			–0.005 (0.005)	
Log Share Immig Rural ₂₀₀₀		0.05 (0.10)	0.05 (0.10)		0.008 (0.02)
Log Share Immig Urban ₂₀₀₀		–0.008 (0.02)	–0.000 (0.02)		0.006 (0.004)
Log Share Immig Interm ₂₀₀₀		–0.08*** (0.03)	–0.06 (0.04)		–0.02** (0.007)
Log Share construction			–0.12 (0.08)		–0.02 (0.02)
<i>Mean VIF</i>	1.32	1.27	1.44	1.34	1.41
Obs	50	50	50	50	50

(continued on next page)

Table A.3 (continued)

	OLS	OLS	OLS	OLS	OLS
R-squared	0.37	0.43	0.46	0.41	0.53
AIC	−83.53	−84.82	−85.25	−223.54	−228.27
BIC	−75.88	−73.34	−71.87	−215.89	−214.89

Level of significance: *** 1 %, ** 5 %, * 10 %. Standard errors are shown in brackets.

Error correction: Robust

Appendix B

Referring to the case of Spain, available statistics emphasize the persistence of some precise trends in immigration inflows during the period 2000–2019.

Table B.1

Total immigration in Spain and geographical origin

	Total Foreign immigrants	EU (%)	EU15 (%)	Europe no EU (%)	Bulgaria (%)	Croatia (%)	Estonia (%)	Hungary (%)	Latvia (%)	Lithuania (%)	Poland (%)	Czech Republic (%)	Slovakia (%)	Slovenia (%)	Romania (%)
2000	923879	40,6	40,6	14,4	0,3	0,1	0,0	0,1	0,0	0,0	0,9	0,1	0,0	0,0	0,7
2001	1370657	30,4	30,4	11,7	0,9	0,1	0,0	0,1	0,0	0,1	1,0	0,1	0,1	0,0	2,3
2002	1977946	24,8	24,8	10,7	1,5	0,1	0,0	0,1	0,0	0,3	1,0	0,1	0,1	0,0	3,4
2003	2664168	22,1	22,1	10,4	2,0	0,1	0,0	0,1	0,0	0,3	0,9	0,1	0,1	0,0	5,2
2004	3034326	19,4	19,4	10,1	2,3	0,0	0,0	0,1	0,0	0,3	0,9	0,1	0,1	0,0	6,9
2005	3730610	20,8	19,1	10,5	2,5	0,0	0,0	0,1	0,0	0,3	1,0	0,1	0,1	0,0	8,5
2006	4144166	22,2	20,3	11,0	2,5	0,0	0,0	0,1	0,0	0,4	1,1	0,1	0,1	0,0	9,8
2007	4519554	37,8	21,2	11,1	2,7	0,0	0,0	0,1	0,0	0,4	1,4	0,1	0,1	0,0	11,7
2008	5268762	39,9	20,7	10,7	2,9	0,0	0,0	0,1	0,0	0,4	1,5	0,2	0,1	0,0	13,9
2009	5648671	40,2	20,8	10,6	2,9	0,0	0,0	0,1	0,1	0,4	1,5	0,2	0,1	0,0	14,1
2010	5747734	40,9	21,0	10,7	2,9	0,0	0,0	0,1	0,1	0,4	1,5	0,2	0,1	0,0	14,5
2011	5751487	41,6	21,1	10,9	3,0	0,0	0,0	0,2	0,1	0,4	1,5	0,2	0,1	0,0	15,1
2012	5736258	42,6	21,4	11,2	3,1	0,0	0,0	0,2	0,1	0,4	1,5	0,2	0,1	0,0	15,6
2013	5546238	42,5	21,3	11,4	3,0	0,0	0,0	0,2	0,1	0,4	1,4	0,2	0,1	0,0	15,7
2014	5023487	40,9	19,6	10,8	3,0	0,0	0,0	0,2	0,1	0,4	1,4	0,2	0,1	0,0	15,9
2015	4729644	41,2	19,8	11,2	3,0	0,0	0,0	0,2	0,1	0,4	1,3	0,2	0,1	0,0	15,9
2016	4618581	39,9	19,2	11,1	2,9	0,0	0,0	0,2	0,1	0,3	1,2	0,2	0,1	0,0	15,5
2017	4572807	38,9	18,8	11,0	2,8	0,0	0,1	0,2	0,1	0,3	1,2	0,2	0,1	0,0	15,0
2018	4734691	37,8	18,8	10,9	2,6	0,1	0,1	0,2	0,1	0,3	1,1	0,1	0,1	0,0	14,3
2019	5036878	36,4	18,5	10,6	2,4	0,1	0,1	0,2	0,1	0,3	1,1	0,1	0,1	0,0	13,3

(Source: INE)

Information in Table B.1 refers to the stock of immigrant in Spain for the period 2000–2019. Statistics provide evidence that most of foreign immigrants come from no-European Countries (both in Europe or outside like Latin America). Immigration from EU countries account for (around) 40 % of the stock of immigrants and the core of this share is from EU15 countries (around 20 %). The enlargement of the EU to Eastern countries fuelled a big massive entry of Romanian in Spain whose stock size is comparable to the overall stock of immigrants for the EU15 countries.²³

References

- Acemoglu, D., Restrepo, P., 2017. Secular stagnation? The effect of aging on economic growth in the age of automation. *Am. Econ. Rev.* 107 (5), 174–179.
- Adserà, A., Ferrer, A.M., Hernanz, V., 2023. Differences in skill requirements between jobs held by immigrant and native women across five European destinations. *Popul. Res. Policy Rev.* 42, 38.
- Aksoy, Y., Basso, H.S., Smith, R., Grasl, T., 2019. Demographic structure and macroeconomic trends. *Am. Econ. J. Macroecon.* 11 (1), 193–222.
- Anselin, L., 2017. A local indicator of multivariate spatial association: extending Geary's c. *Geogr. Anal.* 51 (2), 133–150.
- Backman, M., Karlsson, Ch., 2023. Ageing places: convergence and the role of foreign population. *Reg. Stud.* 58 (5), 922–937. <https://doi.org/10.1080/00343404.2023.2228347>.
- Basso, H.S., Jimeno, J.F., 2021. From secular stagnation to Robocalypse? Implications of demographic and technological changes. *J. Monet. Econ.* 117, 833–847.
- Bisciari, P., Essers, D., Vincent, E., 2020. Does the EU convergence machine still work? *NBB Econ. Rev.* June.
- Borjas, G.J., 1995. The economic benefits from immigration. *J. Econ. Perspect.* 9 (2), 3–22.
- Carrasco, R., 2024. Algunas reflexiones sobre el fenómeno de la inmigración en España: percepción social versus efectos reales. *Apunt. Fedea* n. 2024/26.
- Chassamboulli, A., Fontaine, I., Gálvez-Iniesta, I., Gomes, P., 2024. Immigration and labour market flows. *Labor Econ.* (86), 102454 (vol).
- Collantes, F., Pinilla, V., Saéz, L.A., Silvestre, J., 2014. Reducing depopulation in rural Spain: the impact of immigration. *Popul. Space Place* 20, 606–621.
- Daniele, F., Honiden, T. and Lembecke, A.C. (2019): "Ageing and productivity growth in OECD regions: combatting the economic impact of ageing through productivity growth?", OECD Regional Development Working Papers 2019/08.
- European Commission (2018) European Construction Sector Observatory- Country profile Spain.
- European Commission (2022) European Construction Sector Observatory- Country profile Spain.
- Garcés-Mascareñas, B., Güell, B., 2021. Temporeros agrícolas en contexto de pandemia: nuevas caras de un viejo problema. *Anu. CIDOB De. la Inmigr.* 6N. 2020 86–100.
- García Serrano, C., Hernanz, V., 2023. US and them: job quality differences between natives and immigrants in Europe. *Int. Migr.* 61 (2), 154–178.
- Gutiérrez, E., Benito-Morales, E. and Ramos, R. (2020): Tendencias recientes de la población en las áreas rurales y urbanas de España Documento de trabajo n. 2027, Banco de España.
- Henning, M., Westlund, H., Enflo, K., 2023. Urban-rural population changes and spatial inequalities in Sweden. *Reg. Sci. Policy Pract.* 15, 878–892.
- Krisjane, Z., Berzins, M., Krumins, J., Apsite-Berina, E., Balode, S., 2023. Uneven geographies: ageing and population dynamics in Latvia. *Reg. Sci. Policy Pract.* 15, 893–908.
- Krugman, P., 1981. Intraindustry specialization and Gains from Trade. *J. Political Econ.* 89 (5), 959–973.

²³ The important immigration flow of Romanian in Spain has been documented by Viruela Martínez (2011). This migration flow is mostly driven from labor purposes. A sizable group of Romanian immigrants were already present in Spain as illegal immigrants prior the EU enlargement that -de facto- regularized their position. Most of Romanian immigrants live in small cities and rural places and are employed mostly in construction, agriculture and domestic services.

- Lardiés-Bosque, R., del Olmo-Vicen, N., 2023. The impact of foreign immigration on the revitalization of rural areas in Spain. In: Laine, J.P., Rauhut, D., Gruber, M. (Eds.), *Assessing the Social Impact of Immigration in Europe*. EE Elgaronline, pp. 130–148. <https://doi.org/10.4337/9781803927695.00016>.
- Lebrusán Murillo, I., Cáceres Arévalo, P. and Brey, E. (2019) “El servicio doméstico como vía de acceso a la regularización administrativa en España” *Anuario CIDOB de la Inmigración* 2019, p. 246-272.
- Llorens i Jimeno, E. and Mestres Domènech J. (2020): “The impact of ageing on Spain's economic growth: a regional focus”, *CaixaBank working paper series 01/20*, September 2020,
- Loras-Gimeno, D., Díaz-Lanchas, J., Gómez-Bengoechea, G., 2025. Rural depopulation in the 21st century: a systematic review of policy assessment. *Reg. Sci. Policy Pract.*, 100176 <https://doi.org/10.1016/j.rspp.2025.100176>.
- Maani, S.A., 2016. Ethnic networks and location choice of immigrant. *IZA World Labor* n. 2016/284. <https://doi.org/10.15185/izawol.284>.
- Maestas, N., Mullen, K.J., Powell, D., 2023. The effect of population aging on economic growth, the labor force, and productivity. *Am. Econ. J. Macroecon.* 15 (2), 306–332.
- Meister, M., Niebuhr, A., Peters, J.C., Stiller, J., 2023. Local attributes and migration balance-evidence for different age and skill groups from a machine learning approach. *Reg. Sci. Policy Pract.* 15, 794–825.
- Monfort, Ph. - European Commission, Directorate-General for Regional and Urban Policy, (2020): “Convergence of EU Regions Redux- Recent trends in regional disparities ” EU Directorate-General for Regional and Urban Policy, WP 02/2020 Publications Office, 2020, <https://data.europa.eu/doi/10.2776/27556>.
- Muroishi, M., Yakita, A., 2022. Urbanization and population contraction. *Lett. Spat. Resour. Sci.* 15, 543–553.
- Natale, F., Bernini, A., Seiger, F. and Kajander, N., (2024): Old Age does not start at 65, European Commission, Ispra, JRC137524.
- Newbold, K.B., 2015. Population aging: what role for regional science. *Ann. Reg. Sci.* 55, 357–372.
- Nicolini, R., Roig Sabaté, J.L., 2024. The spatial dimension of ageing and growth in European Regions. *Ann. Reg. Sci.* 73, 1649–1679.
- Peri, G., Sparber, B., 2009. Task specialization, immigration, and wages. *Am. Econ. J. Appl. Econ.* 1 (3), 135, 69.
- Prenzel, P., Iammarino, S., 2021. Labour force ageing and the composition of regional human capital. *Econ. Geogr.* 97 (2), 140–163.
- Salvati, L., 2018. Population growth and the economic crises: understanding latent patterns of changes in Greece, 2002-2016. *Lett. Spat. Resour. Sci.* 11, 105–126.
- Serrano-Domingo, G., Cabrer-Borrás, B., Requena-Silvente, F., 2020. Networks and the location of foreign migrants: evidence for Southern Europe. *Invest. Reg. J. Reg. Res.* 47, 97–112.
- Stuart, B.A., Taylor, E.T., 2021. Migration networks and location decisions: evidence from US mass migration. *Am. Econ. J. Appl. Econ.* 13 (3), 134, 75.
- Viruela Martínez, R., 2011. The Romanian migrants in Spain. An exceptional migration flow. *Int. Rev. Soc. Res.* 1 (1), 31–59.