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EMIGRATING TO DEPOPULATED REGIONS IN MEDITERRANEAN EUROPE: DEMOGRAPHIC IMPACT AND CHOICE OF DESTINATION IN A CASE STUDY IN NORTH-EAST SPAIN (ARAGON)

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Abstract: International migration to depopulated areas is a growing field of research; even more so in Spain, one of the European countries most affected by depopulation. This paper analyses, first, the demographic impact of immigration from other countries in Aragon, which has undergone an intense and long process of depopulation throughout most of its territory. Second, we examine the factors that explain the immigrants' choice of destination. The analysis focuses on the period 2000–2016. The basic territorial units of the analysis are the municipality (NUTS 5) and the county (NUTS 4).

Keywords: Rural depopulation, Rural demography, Rural Immigration, Aragon

Resumen: La inmigración internacional hacia zonas despobladas es un campo de investigación en auge. Más aún en España, uno de los países europeos más afectados por la despoblación. En este trabajo se analiza, en primer lugar, el impacto demográfico de la inmigración procedente de otros países en Aragón, que ha sufrido un intenso y largo proceso de despoblación en la mayor parte de su territorio. En segundo lugar, se examinan los factores que explican la elección de destino de los inmigrantes. El análisis se centra en el periodo 2000–2016. Las unidades territoriales básicas del análisis son el municipio (NUTS 5) y la comarca (NUTS 4).

Palabras clave: Despoblación rural, demografía rural, Inmigración rural, Aragon

Highlights:

- At the end of the 20th century, countries in south-west Europe, became very attractive places for immigrants.
- Immigrants also chose regions that had been experiencing profound depopulation processes.
- In Aragon, immigration was the key element for explaining very fast demographic growth in 2000–2008.
- The economic crisis paralysed the role of immigration as a demographic stimulus.
- The immigrants show a clear preference for areas with higher per capita incomes and lower unemployment rates.

1. Introduction

The rural areas of the western Mediterranean countries have a long migratory tradition beginning with their participation in the mass transatlantic emigration of the final decades of the nineteenth century. From the 1950s, the more developed European countries were the principal destination for southern European emigrants. The economic crisis beginning in 1973 reduced the demand for workers in the most developed European countries considerably. The increase in income levels in southern European countries from the mid 1980s contributed to reducing to a minimum the flows of workers from south to north activities (Moch, 2003; Hatton and Williamson, 1994 and 2005; Venturini, 2004; Zimmermann, 2005). The rural to urban internal migrations also played a fundamental role in the exodus of the population from regions specialised in agriculture (Collantes and Pinilla, 2011; Nam, Serow and Sly, 1990).

At the end of the twentieth century, countries such as Spain, Greece, Italy or Portugal inverted their position in the international migratory flows and began to receive many immigrants from Eastern Europe, Latin America and Africa (United Nations, 2006; International Organization for Migration, 2008; King, 2000; Reher and Requena, 2009a and 2009b). It should be noted that the immigrants from less developed countries did not only head towards urban or more industrialised areas but also settled in rural areas that

had a long migratory tradition and as a result, had experienced significant depopulation processes (Collantes et al., 2014; Delgado, 2018 and 2019; Fonseca, 2008; Kasimis, 2008; Morén-Alegret, 2008; Morén-Alegret and Solana, 2004; Gil, 2011; de Miguel et al, 2011). Many of these rural areas had a much lower population in the year 2000 than in 1900, with the principal cause of this loss of inhabitants being emigration to other countries and, often to urban destinations. However, in many rural areas, the population began to increase in around the year 2000, precisely as a consequence of the arrival of the foreign population (e.g., Oliva, 2010; Collantes and Pinilla, 2011; Bayona and Gil-Alonso, 2013; Murua-Múgica and Eguía-Peña, 2016; Sampedro and Camarero, 2016; Solana, 2009; Bayona et al., 2009).

Within this context, the objective of this article is to analyse the new immigration towards traditional rural migratory areas which have, on the whole, undergone considerable depopulation processes. To do this, first, we seek to verify that this immigration has had a significant impact on their demographic system. However, the demographic impact could be highly varied, not only with respect to the urban areas, but also between the depopulated rural areas. Therefore, we wish to determine the factors that are most important to immigrants when they select a destination from the different areas and the extent to which this explains this varied incidence. Depending on these factors, we will also be able to understand the possibilities that depopulated areas have to receive immigrants.

The case study chosen is that of Aragon, in north-east Spain, as its rural areas have experienced one of the longest and most intense depopulation processes (Ayuda et al., 2000; Pinilla and Saéz, 2021). The depopulation that has taken place since the end of the nineteenth century has affected almost the whole of the territory. On the other hand, Aragon is among those regions that have received the most immigrants in Spain since the beginning of the twenty-first century. This substantially transformed its demographic structure, at least until the economic crisis beginning in 2008. In the year 2000, the residents born abroad accounted for less than 1% of the population, by 2008, they represented 11% and in 2016 they accounted for 10%.

This emigration did not move principally to those rural areas that have experienced an intense depopulation phenomena. As in the case of Spain as a whole, the most rural municipalities have received less immigrants, in contrast with larger towns and the major cities (Collantes et al., 2014). Even so, it is highly relevant that the least populated rural territories have been chosen as a destination by a substantial number of people from less-developed countries.

In order to understand the effect of immigration on population dynamics and the factors that have influenced its spatial distribution, we will use a double methodology. On the one hand, using the population census data, we will construct the demographic variables that are fundamental for measuring the impact of immigration on the depopulated rural areas. On the other hand, we will contemplate an econometric model that explains the principal variables that determine the choice of destination by the immigrants.

Our analysis, based both on the demographic analysis and on the econometric model, will not be carried out exclusively on the depopulated rural areas. We will study the whole of Aragon, including, the urban and most dynamic areas, in order to be able to compare the impact of immigration and the variables that explain the choice of destination of immigrants between depopulated rural areas and the rest.

The rest of the article is structured as follows. The second section describes our theoretical framework and the methodology used. The third section briefly explains the principal demographic characteristics of our case study. The fourth analyses the change in the demographic trend experienced in Aragon, particularly in its most depopulated rural areas, as a result of the migratory flows that it received between 2000 and 2008, the year when the economic crisis began. The fifth section studies how the economic crisis experienced from 2008 paralysed the arrival of immigrants and, therefore, restarted the rural depopulation process. The sixth section proposes a multivariate analysis that seeks to explain the reasons determining the choice of destination of the immigrants within the Aragonese territory. Finally, the article finishes with the conclusions section.

2. Theoretical context and methodology

The settling of immigrants from other countries in rural areas during the final decades of the twentieth century and, most of all, the twenty-first century, is a phenomenon common to many more or less developed countries in different parts of the world (Hugo and Morén-Alegret, 2008; Massey, 2008; Perrons, 2009; Wulf et al., 2008). This has been reported in the abundant and varied literature that has grown constantly in recent years, which highlights the active demographic and socio-economic role of this immigration.

One way to theoretically approach this issue is to consider that, among other types of factors, international migration may be principally driven by structural economic factors in destination countries and the connection of migrant networks in both origin and destination countries, creating communities, which contributes to reducing moving and integration costs (e.g., De Haas et al., 2019; Bansak et al., 2021). Labour market demand, especially, has been considered a main "push" determinant of migrant flows. In this regard, in European countries, international migrants tend to be engaged in low-skilled industries such as the rural -agriculture or building/construction sectors (e.g., Friberg 2013; Bock et al. 2016). For instance, the agricultural sector in the Mediterranean European countries has massively employed migrant workers as they constitute a less expensive and more flexible labour than natives (Gertel and Sippel, 2014; Corrado et al. 2017). Nevertheless, studies on the Spanish immigrant communities indicate that there is a significant geographical specialisation depending on nationality and the Spanish region of residence (Viruela Martínez, 2006; García Ballesteros et al., 2009).[2]

However, a second strand of the literature has recently been focusing on the specific characteristics of rural areas in destination countries and migrant integration processes (e.g., Champion, 2012; Collantes et al., 2014; Dufty-Jones, 2014; Shucksmith and Brown, 2016; Rye and Slettebak, 2020, and the works cited therein).[3] Here, economic, demographic and geographic factors have been emphasised in order to better understand when and why immigrants choose rural rather than urban, areas, and which rural areas in particular or to a greater extent (e.g., Rye and Slettebak, 2020; Viñuela, 2021). In rural areas, migration acts as a population refill and it can re-activate the local economy, especially international migration (Hedberg et al. 2012; Papadopoulos 2012). Nevertheless, rural towns may just constitute an entry point and a steppingstone to urban areas. This is exacerbated by the stronger rural-urban mobility of migrants in comparison with the native population (Camarero et al. 2012).

As previously mentioned, in order to analyse how immigration has affected population dynamics and which factors have influenced the migrants' decision to settle in a region, we employ two different methodologies. First, based on the existing annual population registries, we have decomposed the total growth of the population into its two components: natural growth (births minus deaths) and the migratory balance (immigration minus emigration). The population registries are dated on the first of January each year and we have selected three years for our analysis: 2000, 2008 and 2016. In this way, we can study the behaviour of these variables for the whole of the period and for two sub-periods: 2000–2008 and 2008–2016. As well as providing two sub-periods of a similar duration, this division is made to differentiate two very different contexts in the international and Spanish economy. The first corresponds to a phase of intense economic growth, increasing employment and a very high inflow of immigrants in Spain. The second is characterised by the international economic and financial crisis and its impact. The Spanish economy contracted severely, unemployment increased considerably and the influx of immigrants into Spain froze. Although there are data after 2016, we have not included them, as they correspond to a new growth cycle, only interrupted by the pandemic caused by Covid-19 in 2020.

With this methodology, it is possible to determine the impact that immigration has had on the depopulated rural areas for the whole of the period analysed and for each of the two sub-periods. Conducting this analysis spatially for all of the districts of Aragon, we are able to compare its impact

[2] For instance, Romanians in Madrid and Valencia in 2001 were mainly employed in the building/construction sector while in Andalusia, almost 60% of them worked in the agricultural sector (Viruela Martínez, 2006).

[3] See also, by way of example, Carr et al. (2012), Hedlund et al. (2017), McAreavey (2017), Aure et al. (2018), Stockdale et al, (2000), Green et al., (2008), Hugo, (2008), Jentsch and Simard, (2009).

between districts with different degrees of depopulation and the rest. On the other hand, as we will also conduct the same analysis grouping the municipalities according to the number of inhabitants, it will also be possible to determine the impact that immigration has had on the different types of municipalities, from the smallest rural villages to the large cities.

After studying the impact of immigration on the depopulated rural areas, we will then seek to determine the most important factors that influence the choice of destination of the immigrants. To do this, we propose a panel data econometric model that will enable us to identify the factors that determined the choice of destination of the foreign immigrants, using the annual growth rate of the residents born abroad as a variable of study. The unit of analysis is the county, as it is not possible to obtain data on a municipal level and annually for the variables that we wish to use in the model, and the period is 2001–2014. Given that we have differentiated between two sub-periods with very different economic situations, we will repeat the analysis for each of them, 2001–2008 and 2008–2014.

Our explanatory variables are based on recent reviews of literature on the factors that determine the attractiveness of areas of a destination, (e.g., Rye and Slettebak, 2020).[4] In our explanatory model, the explanatory variables are classified into three groups. First, the macroeconomic variables that show the year-to-year economic situation of each county: gross income per capita, unemployment rate and crisis years. Second, we consider the immigrant stock from abroad residing in each county to measure if immigrants prefer to concentrate or to settle where there is less immigration (Rye and Slettebak, 2020). The third group of variables includes those that capture relevant socio-economic structural characteristics. In this regard, the percentage of the population living in municipalities with more than 5,000 inhabitants is used to capture the urbanisation level (Silvestre and Reher, 2014; Sampedro and Camarero, 2018; Ayuda et al., 2021). The last county characteristic included is the occupational structure of the county, differentiating between industry, agriculture, construction and services sectors (e.g., Friberg 2013; Corrado et al. 2017).

3. Background: The demography of a highly depopulated territory

Located in north-east Spain, Aragon has a total area of 47,720 square kilometres and its population in 2016 was 1,308,563 inhabitants. Aragon is divided into three provinces: Huesca, the most northern province; Teruel, the most southern province; and Zaragoza, which is in the centre. Its territory is crossed by two mountain chains: the Pyrenees, located in the north of Huesca and which mark the border with France; and the Iberian Mountain Range, located principally in the province of Teruel and which runs to the south-eastern end of Zaragoza. These two mountain chains are divided by the Ebro Valley, which runs from the north-east to the south-east and occupies the central province of Zaragoza, the southern part of Huesca and the north-eastern part of Teruel. Therefore, it is an enormously diverse territory from a geographical point of view.

Aragon is internally divided into 33 counties (equivalent to the NUTS 4 level) with the aim of bringing policy-making closer to the citizens and guaranteeing the provision of a minimum level of services, given that many of the 730 Aragonese municipalities (NUTS 5) do not have a population large enough to warrant the functions that are normally carried out by the local government[5]. The capital of the autonomous region is Zaragoza.

The network of towns is extremely unbalanced, as the city of Zaragoza has almost 700,000 inhabitants, but the next two largest do not reach one hundred thousand: Huesca (52 thousand) and Teruel (35 thousand). All of the other towns have less than 21,000 inhabitants. More than half of the population of Aragon, therefore, resides in the city of Zaragoza. In recent decades, a metropolitan area has arisen

[4] As the methodology employed is a Fixed Effects panel data, as described in section 6, geographical characteristics, such as altitude or distances that are time invariant, are not included.

[5] The county boundaries were approved by Law 8/1996 of 2 December of the Aragon parliament.

around this city with an explosive demographic growth, doubling its population between the year 2000 and 2016.

The depopulation of Aragon is profound and began early, acquiring particular virulence in the second half of the twentieth century. Therefore, the total population of Aragon grew by just 41% between 1900 and 2016 (as opposed to 150% in Spain as a whole), while two provinces today have a significantly lower population than that of 1900 (10% less in Huesca and 44% in Teruel), and 25 of its 33 counties lost inhabitants throughout the twentieth century, with reductions of more than 70% in the most dramatic cases and more than 50% in a third of them. Fifteen of these counties currently have less than 10 inhabitants per square kilometre. Almost all of the rural counties have lost population and the scarce number of inhabitants that they have gained corresponds to those counties where the development of irrigated agriculture has been able to at least stabilise the population (Silvestre and Clar, 2010). The areas that have lost most population are the mountainous areas both in the north, in the Pyrenees, and in the south, in the Iberian Mountain Range, and the most arid areas.

The choice of Aragon as a case study is justified if we take into account that practically the whole of its territory has experienced an intense depopulation process. As we can observe in Map 1, of its 33 counties, only three increased their population between 1950 and 2000. Two of these three included the two principal cities of Aragon: Zaragoza and Huesca. Therefore, from a spatial point of view, the depopulation processes have affected almost the whole of its territory. The intensity of the loss of population in the second half of the twentieth century was severe: in this period, 21 counties lost more than 25% of their population and nine experienced losses of under 25% (Fig 1).

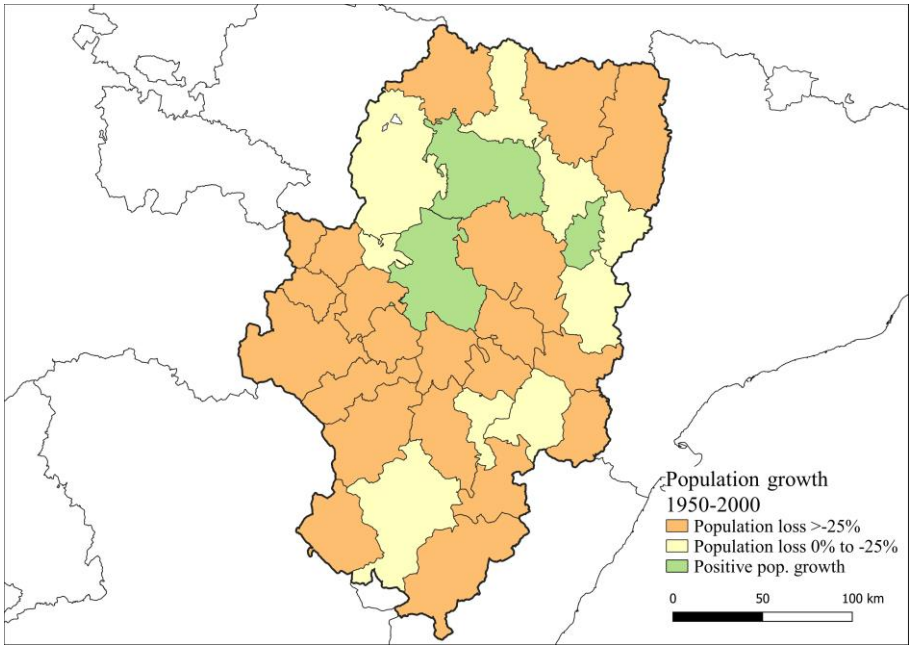

Fig 1. Growth of the population in the counties of Aragon, 1950–2000. Source: own elaboration based on the data of the Aragonese Institute of Statistics

Note: Population growth calculated for the period 1950–2000.

Some studies have concluded that the causes that explain such an intense depopulation process in Aragon could be summarised in the income gap existing between rural and urban areas; the attraction of the dynamic expanding urban labour markets, particularly those of the cities of Barcelona, Valencia and Zaragoza; a significant difference in the access to public services when the welfare state was constructed; and finally, the fewer opportunities for women in terms of both employment and other areas of life in the rural areas compared to the cities (Collantes and Pinilla, 2011; Ayuda et al., 2010).

4. Emigrating to depopulated territories: a radical change in the demographic trend, 2000–2008

4.1 An unexpected and rapid demographic growth

Until the end of the twentieth century, Spain had a very small number of immigrants: they represented less than 2% of the total population. However, from the year 2000, a drastic change took place in this trend with the arrival of a high number of immigrants, who, in the year 2009 accounted for 14% of the total population (Izquierdo, 1996; Arango, 2004; Cachón, 2006; Roxero-Bisby et al., 2011). In very general terms, the immigrants mostly came from countries in Eastern Europe, North Africa and Latin America. The high economic growth in Spain gave rise to abundant opportunities, particularly in the agricultural sector, tourism and construction and also the domestic service sector. These sectors offered an abundance of temporary jobs and sometimes part-time work and high levels of activity outside of the formal economy.

Some of the new immigrants settled in rural areas which had sometimes suffered from strong depopulation processes, leaving a population predominantly made up of senior citizens. The number of residents born abroad in rural Spain increased from 1.8% to 9.3% of the total rural population between 2000 and 2008 (168,044 and 915,695 people respectively, according to the Population Register). The rural areas of the north-east, those of the centre located around Madrid and those on the Mediterranean coast received the highest number of immigrants and experienced a greater demographic impact (Collantes et al, 2014).

Aragon is among those Spanish regions where the arrival of immigrants had the greatest impact. Between the years 2000 and 2008, Aragon increased its population by 137,009 inhabitants, which, in relative terms, is an increase with respect to the initial population of 11.5%. Of the 33 counties making up Aragon, a total of 25 increased their populations, which contrasts with the experience of the last century described above. The higher population growth affected the more urbanised counties in which the only three towns with a population of over 30,000 inhabitants are located. These counties experienced population increases of more than 10%. It also affected the rural areas, given that in the majority of them, there was a population growth of between 5% and 35%. The comparison with the final years of the twentieth century is very important for the depopulated counties. Only three experienced positive growth between 1991 and 1998. In contrast, between 2000 and 2008, twenty-two of a total of 30 counties that had experienced depopulation in the second half of the twentieth century recorded positive growth. Rural depopulated Aragon, therefore, which seemed to be condemned to a certain demographic regression, experienced unexpected and fast growth.

In Map 2, we can observe the variation of the total population on a county level, without considering, for now, the origin of this increase (population, foreign, national or born in the region). There are only eight counties in two areas with negative growth. They all correspond to the group that we have identified as experiencing severe depopulation between 1950 and 2000 (Map 1). The first group is made up of four counties with a predominance of arid territories and a low level of industrialisation with an insignificant service sector, located to the south and east of the city of Zaragoza. The other group is formed by another four counties disseminated throughout the mountainous areas in the Iberian Mountain Range. However, a much higher number of counties of this severely depopulated group, specifically 13, recorded positive growth and of those, six experienced growth of over 10%. All of those that had experienced moderate depopulation recorded positive growth.

Going beyond the spatial dimension of demographic growth, we seek to conduct an analysis that will enable us to characterise the different population nuclei. To do this, we have divided all of the municipalities of the territory into eight groups according to the size of their population in 2015, at the end of the period of study. An additional group, called “Metropolitan area of Zaragoza” (MAZ) includes those municipalities that are located less than 25 kilometres from the Aragonese capital. These are, therefore, municipalities that can be considered as forming part of its metropolitan area and are subject to counter-urbanisation processes (Pinilla et al., 2008 and Pinilla, 2011).

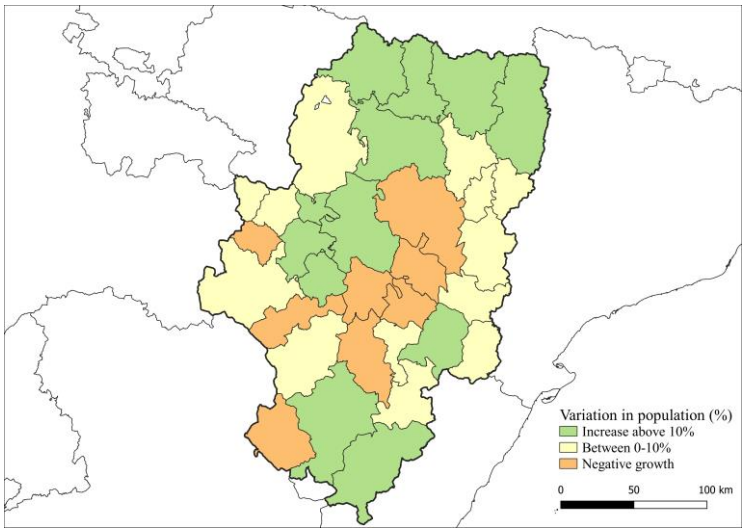

Fig 2. Variation in the population by county (2000–2008). Source: own elaboration based on the data of the Aragonese Institute of Statistics

Table 1 shows large differences in the evolution of the population according to the size of the municipality between 2000 and 2008. Those municipalities with populations of below 500 inhabitants lost population, while the rest gained inhabitants, especially all those municipalities with more than 5,000 inhabitants (with increases above 10%). Specifically, the medium-sized municipalities, of between 5,000 and 20,000 inhabitants experienced a greater relative growth of 15.56%. Throughout the twentieth century, the groups of municipalities with less than 5,000 inhabitants, clearly rural towns, were those that lost population, from a minimum of 17% among those that had between 1,000 and 5.000 inhabitants and a maximum of 86% among those with less than 100 inhabitants. During the last decade of the twentieth century, these four groups also lost population and this loss was progressively greater for the smallest municipalities (Ayuda et al., 2000). In sharp contrast, between 2000 and 2008, only the two smaller groups continued to experience depopulation, while the following two grew considerably.

Tab 1. Evolution of the Population in Aragon by municipalities grouped according to their size (2000–2016). Source: own elaboration based on the data of the Aragonese Institute of Statistics

	Population Register			**Total Variation**		**Variation (%)**	
Size of municipality	***2000***	***2008***	***2016***	***00–08***	***08–16***	***00–08***	***08–16***
Less than 100	12,848	11,832	9,894	-1,016	-1,938	-7.91	-16.38
100–499	93,228	90,040	79,757	-3,188	-10,283	-3.42	-11.42
500–999	60,365	61,836	55,778	1,471	-6,058	2.44	-9.8
1,000–4,999	143,189	154,875	145,520	11,686	-9,355	8.16	-6.04
5,000–19,999	154,662	178,734	176,321	24,072	-2,413	15.56	-1.35
20,000–100,000 *	76,144	86,154	87,846	10,010	1,692	13.15	1.96
More than 100,000**	604,631	666,129	661,108	61,498	-5,021	10.17	-0.75
Metropolitan area of Zaragoza	44,842	77,318	92,339	32,476	15,021	72.42	19.43

* This group only includes the municipalities of Huesca and Teruel, ** This group only includes the municipality of Zaragoza.

Dark green, municipalities with a demographic increase of over 10%; light green, municipalities with a positive growth but lower than 10% and light red, municipalities with negative growth of between 0 and 10%; dark red, municipalities with negative growth of more than 10%.

4.2 Explaining the change in the demographic trend: the importance of immigration

On a county level, the rate of migration between 2000 and 2008 was positive in 31 of the 33 counties, including all of those that had experienced depopulation processes until the last decade of the twentieth

century, except two (Fig. 2).[6] Moreover, the growth of the population was exclusively due to the growth in immigration in all 31 counties, except for the county to which the city of Zaragoza belongs, counteracting the natural negative growth. In the two groups of counties with depopulation in the second half of the twentieth century, the migratory rates were particularly high in 11 of them.

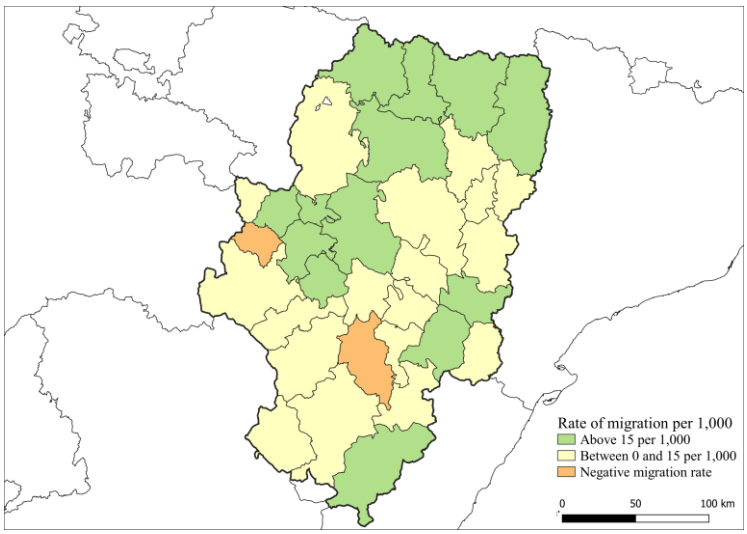

Fig 3. Rate of migration in Aragon (2000–2008). Source: own elaboration based on the data of the Aragonese Institute of Statistics

Furthermore, as we can see in Figure 4, there is quite a close correlation between the migration rate and the population growth rate. In other words, a higher migration rate also corresponds to faster population growth. Given that immigration is practically the only cause of population growth, our second step is to examine the origin of this immigrant population in greater depth. Between 2000 and 2008, the number of residents in Aragon who were born in other countries increased by 143,608 inhabitants, which implies a population increase of 12.07%. However, those born in Spain decreased by 0.55%. The number of people born abroad increased in all of the counties. In the majority of them, the increase in the number of people born abroad represented an increase of around 10% of the total initial population.

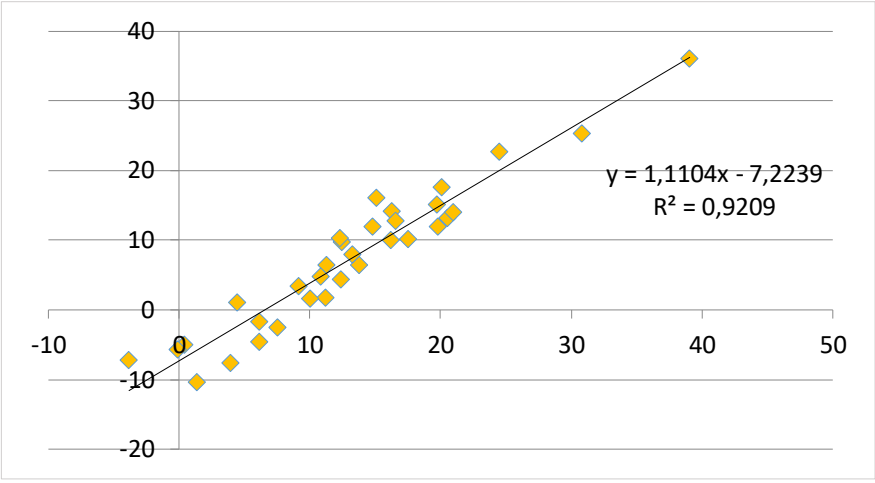

Fig 4. Correlation between the demographic growth rate and the migration rate for the 33 counties of Aragon. Source: own elaboration based on data of the Aragonese Institute of Statistics

The x-axis represents the migration rate and the y-axis the total growth rate.

[6] The rate of migration is the quotient between the net entry of immigrants in the period and the total resident population in the same period, multiplied by one thousand.

Focusing on the municipal level, Table 2 shows that all of the groups of municipalities (grouped according to size) had a positive migration rate between 2000 and 2008. However, when the size of the population increased in the municipalities, the migration rate also increased, with the exception of the city of Zaragoza.[7] This means that the smallest municipalities, which were those most affected by depopulation processes, were also the least attractive to immigrants.

Tab 2. Natural growth rate, migration rate and total rate in Aragon by municipality (2000–2015) (per thousand). Source: own elaboration based on data of the Aragonese Institute of Statistics

	Migration Rate		**Natural Growth Rate**		**Total Rate**	
	2000–2008	2008–2015	2000–2008	2008–2015	2000–2008	2008–2015
Less than 100	0.02 (-0.19)	-9.18 (42.31)	-10.31 (100.19)	-12.52 (57.69)	-10.29	-21.71
100–499	4.46 (-102.63)	-3.13 (22.23)	-8.81 (202.63)	-10.95 (77.77)	-4.35	-14.08
500–999	10.25 (340.72)	-3.90 (34.14)	-7.24 (-240.72)	-7.53 (65.86)	3.01	-11.44
1,000–4,999	13.9 (141.84)	-2.31 (34.74)	-4.1 (-41.84)	-4.34 (65.26)	9.8	-6.65
5,000–19,999	19.03 (105.44)	-0.67 (60.3)	-0.98 (-5.44)	-0.44 (39.69)	18.05	-1.11
20,000–100,000	15.23 (98.74)	1.71 (62.27)	0.19 (1.26)	1.04 (37.73)	15.42	2.75
More than 100,000	11.54 (95.34)	-1.14 (451.7)	0.56 (4.66)	0.89 (-351.7)	12.09	-0.25
MAZ	57.26 (86.16)	15.94 (68.31)	9.2 (13.84)	7.40 (31.69)	66.46	23.34

Red indicates a negative variation in the corresponding rate; yellow an increase of less than 10 per thousand; and green an increase of over 10 per thousand.

Differentiating between the variation of the population born in Spain and that born abroad helps us to determine the origin of the immigrants who have boosted the growth of the population in the municipalities of more than 500 inhabitants or who have slowed down the decrease in the population of those with less inhabitants. In Table 3 we can observe that, for all sizes of municipality, between the years 2000 and 2008, there was a growth in the number of people born abroad. Their impact on the initial population was significant. However, the situation is very different for the case of those born in Spain, whose figures fell, except in the municipalities with populations of between 20,000 and 100,000 inhabitants and the MAZ.

Tab 3. Variation in the resident population of Aragon by municipality, broken down according to place of birth (2000–2016). Source: own elaboration based on the data of the Aragonese Institute of Statistics

	Variation of those born abroad with respect to the initial population		**Variation of those born in Spain with respect to the initial population**	
	2000-8/2000	2008-16/2008	2000-8/2000	2008-16/2008
Less than 100	3.38	0.2	-11.29	-16.18
100-499	6.14	0.15	-9.56	-11.27
500-999	8.51	-1.13	-6.07	-10.92
1,000-4,999	12.76	-0.36	-4.59	-6.4
5,000-19,999	15.66	-0.2	-0.09	-1.55
20,000-100,000	11.73	0.64	1.42	2.61
More than 100,000	12.09	-0.79	-1.93	-1.54
MAZ	17.27	2.33	49.12	21.76

[7] In the capital, there was an exodus of the native population towards the municipalities of its metropolitan area, which, however, has not been offset by the arrival of the foreign immigrants.

In conclusion, we have confirmed that, despite having a certain flow of migrants, the smallest rural municipalities (those that lost the most population in the twentieth century) have not been able to avoid the fall in their population occurring as a result of their negative natural growth and the ageing of an increasingly masculinised population[8]. On the contrary, in the municipalities with more than 500 inhabitants, the arrival of foreign immigrants has led to their greater demographic dynamism.

5. Economic crisis, fall in migratory flows and demographic regression, 2008–2016

5.1 The end of the demographic expansion

After 2008, and as a consequence of the economic crisis, the demographic trend in Aragon changed drastically. In Table 1, we can see that between 2008 and 2016, the region lost 20,000 inhabitants, which is a fall of 1.38%. Figure 5 shows this change clearly. The annual population growth rate was around 1.25% before 2009. After an increase around this year, it then had negative values from 2013.

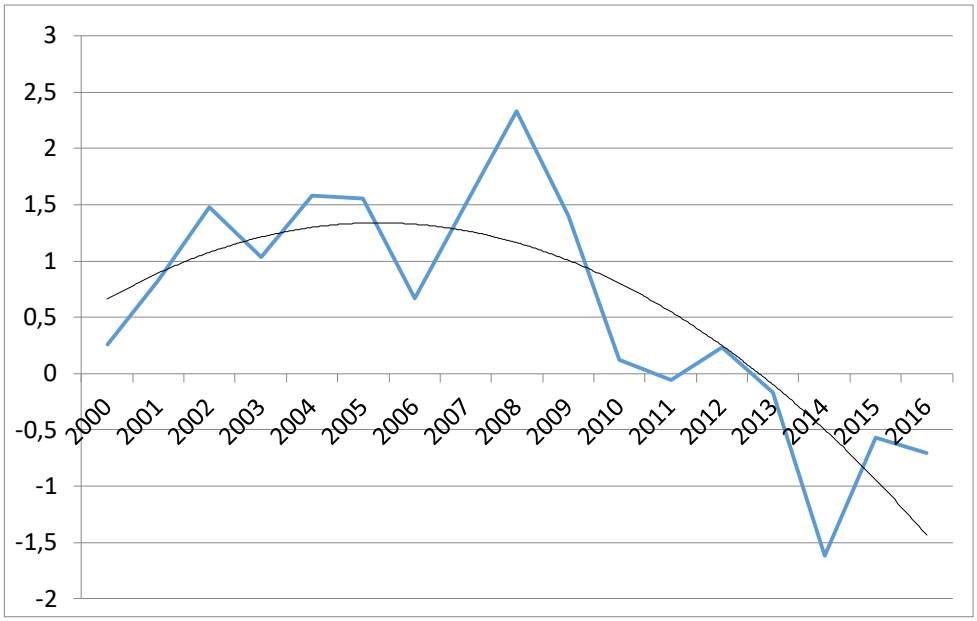

Fig 5. Variation of the population in Aragon (% of annual variation). Source: own elaboration based on data of the Aragonese Institute of Statistics

The black line represents the second-order polynomial trend of the growth figures.

On a county level, the population only grew in five counties from 2008 (as opposed to 25 during the previous period). Moreover, six counties experienced population decreases of over 10% and another thirteen of between 5 and 10% (Figure 6). The counties that experienced the most severe depopulation in the second half of the twentieth century were those that decreased the most. Of the 21 in this group, 16 lost more than 5% of their population during these years, another four experienced losses and only one had positive growth. After the parenthesis of the years of rapid economic growth between 2000 and 2008, the great majority (28 of 30) of the counties that had experienced depopulation in the previous century began to lose population again.

On a municipal level, the population increased in only two groups of the classification used in Table 2; those formed by the MAZ and the group of municipalities with a population of between 20,000 and 100,000. The rural municipalities, therefore, began to experience depopulation again.

[8] Masculinisation and ageing data in accordance with the size of municipality in Aragon in Ayuda et al. (2000) and Pinilla et al., (2008).

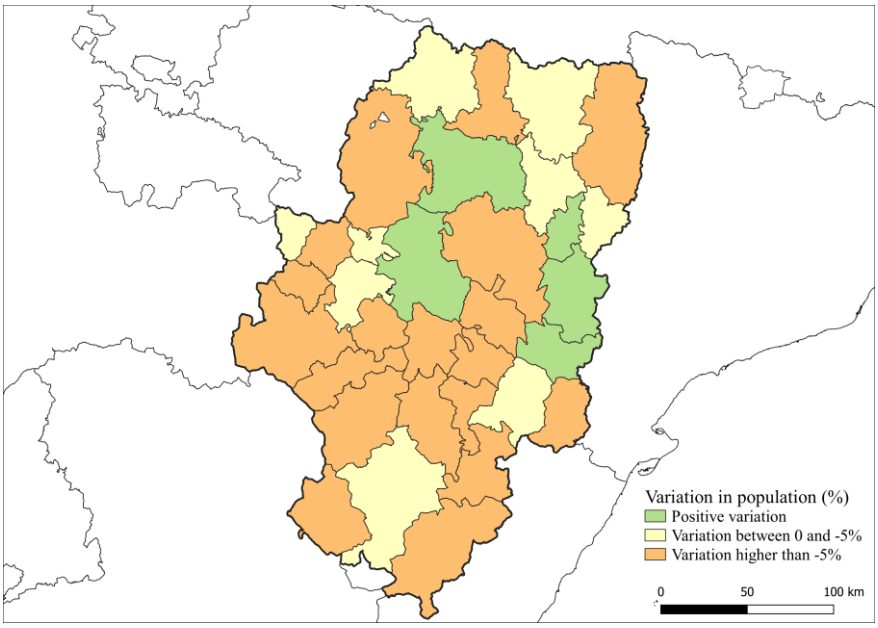

Fig 6. Variation in the population by county (2008–2016). Source: own elaboration based on data of the Aragonese Institute of Statistics

5.2 Economic crisis and migratory paralysis

Between 2008 and 2016, the migratory rate experienced a turnaround with respect to the previous years (Figure 7). After 2008, only ten counties had positive migration rates (all in the previous period). Furthermore, contrary to the high values of the migration rate in the previous period, after 2008, even those counties with positive values did not exceed 5 per thousand, except in one case. Map 5 shows that the counties with positive migration rates form a wide circle around Zaragoza, while those with negative rates tend to be located in the mountainous area in the southern half of Aragon. In the case of the counties that had lost population in the second half of the twentieth century, the vast majority now had negative migratory rates (23 of 30). While in previous years, the large positive migratory flows had compensated the negative natural growth, in these years, this negative natural growth was coupled with a negative migratory balance in the majority of the counties, resulting in an overall loss of population in the depopulated counties.

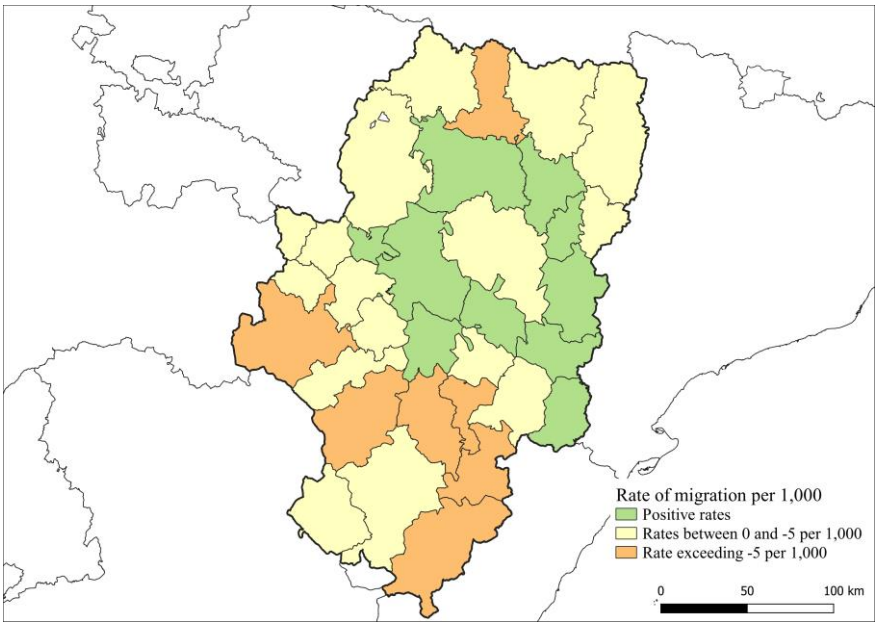

Fig 7. Rate of migration in Aragon (2008–2016). Source: own elaboration based on the data of the IAEST

An important difference between the two periods, as shown in Table 2, is that in the second, the variation in the total growth of the population is not fundamentally determined by the migration rate. In the majority of the counties, the demographic variation, in this case, largely negative, can be explained in equal measure by the migration rate and the natural growth rate. Therefore, the demographic behaviour in most of the counties is explained by a combination of the negative values of both rates. From the end of the twentieth century, the negative natural growth was the principal cause of the loss of population in the counties experiencing loss (Ayuda et al., 2000).

If on a municipal level, we distinguish between the variation in the number of people born abroad and in Spain, Table 2 shows that during the period 2008–2016, Aragon lost a total of 4,341 inhabitants born abroad (contrary to the previous period in which it gained more than 140,000). This figure is determined by the (net) departure of immigrants due to the crisis. However, this is not a very high figure, taking into account the increase in unemployment during this period. On the other hand, the variation in those born in Spain is negative and the reduction, of 14,014 people, is more than double that of the previous period. Therefore, if the key variable in the period prior to 2008 was the growth of the foreign population, after this year, the most characteristic feature is the reduction in the population born in Spain. The situation is similar on a county level. Only 15 counties have a positive variation in those born abroad. We could highlight, therefore, that the sign of migration, and more specifically of foreign immigration, was reversed in this period. Between 2000 and 2008, the counties experienced a significant influx of people from abroad but the following period, this flow was inverted, giving rise to a small migratory outflow. In the case of the counties which had most experienced previous depopulation processes, the migratory rate was negative in these years.

When the analysis is performed on groups of municipalities, the migration rate shifted from being positive in all of them to being negative also in all of them, except for in the MAZ and the towns with populations of between 20,000 and 100,000. This contrasts greatly with what occurred in the previous period. The highest negative values are those of the smallest municipalities, which had an almost zero growth rate which decreased to -9.18 per thousand in this period. This period (from 2008 to 2016) was characterised by a paralysis of the migratory flow from abroad. This meant that in the municipalities where the demographic growth was based on this flow, the population remained the same or shrank. If we observe the variation in the number of people born abroad, we can see values in the majority of the negative groups. It is interesting that the smallest municipalities (up to 500 inhabitants) were more resilient and recorded positive net entries of immigrants from abroad, although with very low numbers. Consequently, the economic crisis had a strong effect on the change in the demographic trend, as although the number of immigrants from abroad who abandoned Aragon was quite small in net terms, the paralysis in the arrival of new immigrants due to the difficult conditions led to the return to the demographic situation that had existed before the year 2000. Consequently, if immigration from abroad had reversed or slightly cushioned the losses of population in the counties and municipalities most affected by it, its paralysis led to a new process of depopulation, although principally caused by the fact that immigration was no longer compensating the negative natural growth of a population that was strongly ageing in the depopulated areas (Ayuda et al., 2000).

6. An explanatory model of the choice of destination by foreign immigrants

In previous sections, we have seen how a region which had been suffering from an intense depopulation process for many years became an important destination for foreign immigrants in the twenty-first century, although the arrival of immigrants has had a lesser impact on the smaller municipalities. We have also seen that this process, in reality, can be divided into two periods. The first, until 2008, was characterised by a strong increase in foreign immigrants, who came to represent more than 10% of the resident population, whereas before, they accounted for only 1%. The consequence was significant demographic growth, even in the most depopulated counties. In the second period, after the onset of the economic crisis in 2008, there was a small outflow of immigrants, but significant enough to incur losses in the population in a large part of the territory.

Our objective in this section is to attempt to determine the decisive factors that explain the decision of immigrants when choosing a destination. In order to do this, we use the following linear estimation:

$$TCE_{it} = \alpha_i + \beta_1 Income_{it-1} + \beta_2 Unemployment_{it-1} + \beta_3 Immg\ Stock_{it-1} + \beta_4 Crisis_{it-1} + \beta_5 Econ\ Sectors_{it} + \beta_6 Urban_{it-1} + \mu_{it-1} \quad (1)$$

where the dependent variable (TCE) is the annual growth rate of the residents born abroad, and i indicates the county, and t the year. The explanatory variables are introduced lagged by one period in order to obtain the causality effect. The disturbance μ_{it-1} refers to the possibility that two counties in the same circumstances have a different growth due to factors that are not taken into account.[9] The panel data method is used, employing County Fixed Effects in order to control for geographical characteristics, such as altitude or distances that are time invariant.[10]

As mentioned in section 2, the explanatory variables are classified into three groups. First, the macroeconomic variables that show the year-to-year economic situation of each county. These are gross income per capita ($Income$, the unemployment rate ($Unemployment$), and a dichotomous variable that seeks to capture the effect of the economic crisis (equal to 0 until 2007 and 1 from 2008) ($Crisis$). It is to be expected that the immigrants opt for counties with low levels of unemployment and high incomes, and that the crisis would discourage their arrival.

Second, we consider the immigrant stock from abroad residing in each county at the end of the previous year ($Immg\ Stock$). The effect of the previous stock of immigrants is not easy to predict. On the one hand, we can assume that immigrants will tend to concentrate where there are other immigrants, particularly if they are of the same origin. However, it is also possible that immigrants prefer to settle where there is less immigration and, therefore, a priori have access to more employment opportunities

The third group of variables includes those that capture relevant socio-economic structural characteristics. One variable captures the percentage of the population living in municipalities with more than 5000 inhabitants over the total population of the county, which indicates its level of urbanisation ($Urban$). In this case, we could expect that a high rate of urbanisation would favour the settlement of immigrants, as the largest municipalities offer more public and private services (Sampedro and Camarero, 2018; Ayuda et al., 2021). Moreover, it may be the case that the type of immigrant arriving to Aragon prefers urban destinations. In this sense, the literature has shown the existence of different preferences with respect to the type of place of the destination according to a series of characteristics of the immigrants (e.g., Silvestre and Reher, 2014). The last variable reflects the occupational structure of the county, measured through the percentage of the population working in agriculture, construction and services, and using industry as the reference group($Econ\ Sectors$). This variable is included in order to determine whether the immigrants prefer counties specialised in sectors where it is easier for them to find work.

Table 4 shows some characteristics of the variables. All of the variables except *Income* and *Crisis* are expressed as percentages. The difference between the maximum and minimum value of several variables is noteworthy, highlighting the high degree of heterogeneity between the counties. In the second part of the table, we have also added the average of all the variables for each of the groups into which we have divided the counties, as the differences between them will help us to interpret the results.

[9] We have used robust estimators for fixed effects regression to correct for heteroskedasticity

[10] The Hausman test determines that the most appropriate model is that of fixed effects.

Tab 4. Some characteristics of the variables of the model. Source: own elaboration based on the data of the IAEST

Variable	**Observations**	**Mean**	**Standard Deviation**	**Min.**	**Max.**
Annual growth rate of the residents born abroad (%)	462	7	11.3	-22.3	56.3
Income (thousands)	462	11.7	2.8	7	18.7
Unemployment (%)	462	11.2	7.3	2.5	38.9
Immigrant stock (%)	462	9.4	4.7	.7	20.9
Crisis (dummy)	462	.4	.5	0	1
Agricultural workers (%)	462	19.1	11.9	.9	58.7
Industrial workers (%)	462	22.7	13.2	4.4	68.5
Construction workers (%)	462	11.8	4.4	4.3	27.9
Service workers (%)	462	46.4	14.7	16.2	81.8
Urban > 5000 (%)	462	32	34	0	96.5

Variables' mean for different counties' groups

	All Sample	Severely Depopulated counties (>-25%)	Moderate Depopulated counties (0 to -25%)	Positive Growth
Annual growth rate of the residents born abroad (%)	7	7	7.5	7.5
Income (thousands)	11.7	10.3	13.5	16.2
Unemployment (%)	11.2	11.6	10.3	10.6
Immigrant stock (%)	9.4	9.2	9.6	9.7
Crisis (dummy)	.4	.4	.4	.4
Agricultural workers (%)	19.1	23	14	7.1
Industrial workers (%)	22.7	22.3	25.3	18
Construction workers (%)	11.8	11.9	12.2	10.1
Service workers (%)	46.4	42.8	48.6	64.8
Urban > 5000 (%)	32	13.5	59	80.6
Observations	462	294	126	45

Tables 5 and 6 show the results for the regressions using the model explained in Section 3. The explanatory variables are introduced sequentially. The first table shows the results of the period 2001–2014 as a whole. Both per capita income and the rate of unemployment are significant and have the expected signs. In other words, immigrants tend to choose counties with a higher level of income and a lower level of unemployment. Income was lower in the depopulated counties, which had a negative effect on the choice of these destinations, although their unemployment rate was slightly lower, which encouraged the settlement of immigrants.

The initial stock of immigrants is significant and its effect is negative. That is, it seems as though immigrants tend to choose counties with less settled immigrants and, therefore, presumably with more employment opportunities. In this case, the lower stock of immigrants in the depopulated counties facilitated their selection as destinations.

The crisis of 2008 discouraged new arrivals and even led some immigrants to leave. The variable of urbanisation is also significant and positive; immigrants prefer counties with higher levels of urbanisation. Here, we can see that the differences in this rate between the three groups of counties was enormous. The very low rate of urbanisation of the most depopulated counties is a fundamental factor for explaining a lower preference for them as destinations. With respect to the occupational structure, immigrants tend to choose counties in which there are many opportunities, where the industrial sector is smaller and the other sectors are more important, with no large differences existing between the other sectors. In any event, the size of the estimated coefficients is the largest in the case of construction. The services sector

is highly varied. However, as it is well known, immigrants have tended to occupy positions related to domestic service and caring for elderly people and children. The effect of the occupational structure of the depopulated counties on the attraction of immigrants is, therefore, varied: they benefited from their specialisation in agriculture and lack of specialisation in industry, but having a less developed services sector negatively affected them.

Tab 5. Results of the model regarding the choice of destination by immigrants from abroad, 2001–2014. Source: own elaboration based on the data of the IAEST

Variables	Model 1	Model 2	Model 3	Model 4
Income	2.765***	2.460***	2.204***	2.177***
	(0.515)	(0.546)	(0.527)	(0.523)
Unemployment	-0.618***	-0.426***	-0.465***	-0.481***
	(0.136)	(0.125)	(0.145)	(0.147)
Immigrants stock	-1.411***	-1.126***	-1.134***	-1.149***
	(0.318)	(0.386)	(0.359)	(0.348)
Crisis		-4.541*	-4.535**	-4.221*
		(2.412)	(2.206)	(2.121)
Employment Variables % (Ref. Industrial workers)				
Agricultural workers			0.358**	0.366**
			(0.168)	(0.167)
Construction workers			0.542**	0.573**
			(0.266)	(0.274)
Service workers			0.407*	0.414*
			(0.205)	(0.204)
Urban 5000				0.185**
				(0.069)
Obs.	462	462	462	462
No. of Counties	33	33	33	33
Adj. R2	0.553	0.559	0.566	0.566
Town FE	Yes	Yes	Yes	Yes

Significance: *** is 1%, ** is 5% and * is 10%. For the occupational structure, the reference is the percentage of workers in the industrial sector.

Table 6 divides the period of study into two sub-periods, before and after the crisis. First, it is important to indicate that neither the sign nor the significance of the variables tend to change, although the size of the coefficients does. Per capita income and the unemployment rate seem to be the most important for attracting immigrants in the first period than for their exodus in the second. The stock of immigrants exercised a greater influence in the second period to discourage the arrival of new immigrants (or encourage their departure). In other words, more immigrants have left those counties with a higher number of immigrants. This result highlights the difficulties to find employment in situations of crisis. Urbanisation is only significant in the second period, which suggests that urban destinations, in reality, were only able to attract immigrants in the context of crisis. During the main period of immigration, both urbanised and rural areas exercised a similar capacity of attraction. On the contrary, the occupational structure of the counties seems to only have been relevant before the crisis. This would imply that the departure of immigrants in the second period was not determined by the occupational structure.

Tab 6. Results of the econometric model for each of the sub-periods. Source: own elaboration based on the data of the IAEST

	2001–2008		2008–2015	
Variables	Model 5	Model 6	Model 7	Model 8
Income	4.928***	5.114***	1.453*	1.176
	(0.881)	(0.874)	(0.716)	(0.708)
Unemployment	-1.436**	-1.725***	-0.577***	-0.489**
	(0.550)	(0.607)	(0.105)	(0.179)
Immigrants stock	-2.192***	-2.075***	-3.178***	-3.436***
	(0.579)	(0.628)	(0.892)	(0.909)
Employ. Variables % (Ref. Industrial workers)				
Agricultural workers		0.596*		0.386
		(0.329)		(0.334)
Construction workers		0.906*		0.449
		(0.483)		(0.375)
Service workers		0.311		0.079
		(0.454)		(0.318)
Urban 5000		-0.759		0.240***
		(0.642)		(0.059)
Obs.	264	264	231	231
No. of Counties	33	33	33	33
Adj. R2	0.164	0.182	0.564	0.566
Town FE	Yes	Yes	Yes	Yes

Significance: *** is 1%, ** is 5% and * is 10%

For the occupational structure, the reference is the percentage of workers in the industrial sector.

7. Conclusions and implications for public policies

From a demographic point of view, Aragon is a territory that reflects the scenario of many European Mediterranean regions very well. Due to industrialisation and modern economic growth, a great part of rural Europe suffered, at different paces and different moments, profound depopulation processes (Collantes and Pinilla, 2011). These were mainly caused by the mass rural-urban emigration and emigration abroad. One of the fundamental consequences was a significant decrease in the population in absolute terms and the ageing and masculinised population structure. At the end of the twentieth century, although only a small number of immigrants abandoned these depopulated rural regions in Europe to go to the cities or abroad, these places continued to lose population as their ageing and masculinised demography generated a clearly negative natural growth (Maclaren et. al, 2019).

At the end of the twentieth century, the countries in southern Europe, particularly those in the west, had obtained high levels of economic development, per capita income and well-being. This meant that they became very attractive places for immigrants who, coming from developing countries in Africa or Latin America or Eastern European economies in transition, were seeking to improve their situation. These migrants not only headed towards more dynamic, more urban areas with higher population densities, but they also chose regions that had been experiencing profound depopulation processes for decades and had very low population densities.

Within this context, we have examined the case of Aragon as it is highly representative of the situation of the regions described in the previous paragraph. The significant depopulation process suffered across most of its territory not only slowed from the year 2000 but a very fast demographic growth was experienced in the majority of its counties and municipalities. The economic crisis which began in 2008 reversed the situation, as the small net loss of foreign immigrants paralysed the role of immigration as a demographic stimulus and therefore the population decreased again, mostly due to the negative natural growth. This study has, therefore, revealed that immigration has been the key element for explaining

the evolution of the population in Aragon, as in many other rural territories of Western Mediterranean Europe.

The study also highlights that the growth resulting from the arrival of immigrants has been diverse in Aragon. Although the depopulated counties and rural municipalities of over 500 inhabitants changed a decades-old trend of population loss, their growth has been lower than that of the more dynamic counties and larger municipalities. This is because the arrival of immigrants has also been varied: greater in the larger towns and lower in the rural areas.

Consequently, it is fundamental to know the main reasons that determine the choice of destination by the immigrants. The Aragonese territory, which has a high level of urban, economic and social heterogeneity, has been used as a case study in order to precisely determine these reasons, with the help of an econometric model. The immigrants show a clear preference for areas with higher per capita incomes, lower unemployment rates and in situations of crisis resist more in those with a higher level of urbanisation. Furthermore, they seem to have greater difficulties to find work in the industrial sector than in agriculture, construction and services.

An interesting result is the negative effect of the stock of immigrants, although again, it is particularly important in situations in which there is a high level of unemployment, such as during the crisis. This stock could have difficulties to keep their jobs in segmented labour markets in which the contraction of the economic activity places immigrants in a highly vulnerable position. In this sense, the periods of crisis paralyse the arrival of immigrants. Although somewhat surprising, immigrants resist abandoning the chosen destination once they are settled there.

Now that depopulation has acquired enormous media, political and social repercussions in Spain and other European countries (Collantes and Pinilla, 2019; Bock, and Haartsen, 2021; Czibere et al., 2021; Sáez, 2021), this study provides us with some lessons that should be taken into account for the future when designing public policies.

First, the demographic evolution of the depopulated regions critically depends on the arrival of immigrants, fundamentally from less developed countries. Any policy that is implemented, therefore, to invigorate or maintain the demography of depopulated regions should take this fact into account from a double perspective. On the one hand, the settlement of immigrants in these regions will be facilitated when the transparency and information of the markets is improved, which are essential aspects for the choice of destination, particularly with respect to labour markets and housing (Sáez et al. 2001; Pinilla and Sáez, 2009:134–141). Furthermore, it should be taken into account that in adverse economic circumstances, whether on a local or more general level, the migratory flow paralyses and net departures should be forecast. On the other hand, whether immigrants remain will depend on the continuance of the conditions that led them to take the decision to settle there. Their behaviour when choosing a place of residence is similar to that of the native population, although with a greater facility for mobility when conditions worsen.

Second, the choice of destination is also conditioned by characteristics of the possible places themselves, which we can consider as structural and not circumstantial, such as the economic or population structure. Therefore, not all areas have the same opportunities to be chosen by immigrants. A destination is more likely to be chosen when there is a high presence of economic sectors in which immigrants have a greater possibility of finding work. Similarly, the rural areas in which smaller towns are predominant tend to be chosen less, particularly at moments when economic growth is not so fast.

Finally, this study has revealed that the possibilities that the regressive demographic trend will reverse in rural areas depends essentially on the size of the population nuclei. Like the native population, immigrants are sensitive to the access to public and private services, which cannot be provided at the same level in all places. Public policies will take critical decisions about how and where these services are offered.

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