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Item 10 – Small population and sub-national population projections

Sub-national and foreign-born population projections: the case of Andalusia.

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1.   INTRODUCTION

Over the last fifty years population structure has experienced a dramatic change in Spain, as it has in most European countries. In that period, life expectancy at birth showed an ever-growing trend and fertility rates settled well below replacement ratio. As this process is expected to continue, population ageing has become a key issue and a challenge in our society.

Under those circumstances, natural growth remains slightly above zero-threshold in Spain, so immigration over the last decade is responsible for population growth.

Foreign born population´s sex and age structure differs from the general one, so it modifies the trends in population ageing. But there are two issues which deserve special mention. First, foreign-born population does not settle uniformly across the territory but just in certain locations, so it modifies regional and local dynamics of population change stronger than national ones.

Second, -last but not least- there is strong evidence pointing to a differential demographic behaviour of immigrants, and within immigrants too, depending on their origins. Thus, migration hypothesis might have a significant indirect effect on future fertility, mortality and also on internal-mobility patterns. Unbiased population projections should allow for incorporating different demographic behaviours.

The aim of this paper is to present data sources, methodology and results of   the new population projections of Andalusia Region which distinguish several groups of population based on their place of birth. The Andalusian case is especially interesting for our purpose as it presents a wide range of immigrant profiles. On the one hand there is a significant inflow of retired population coming from EU countries; on the other hand labour oriented immigration has increased in recent years.

 In the first part of the paper it is discussed whether populations should be distinguished by nationality or place of birth, and the reasons which led us to choose place of birth as criteria. In the second part of this paper we will describe the projection of the components of population change, namely fertility, mortality and migration. Lastly, main results are presented.

2.   NATIONALITY VERSUS PLACE OF BIRTH

In this work we describe the recent work on population projections made at the IEA (Instituto de Estadística de Andalucía, Statistical Institute of Andalucía). Its main novelty is that population is not only distinguished by sex, age and location, but also using as fourth variable the origin of individuals.

Different Statistical Institutes have already addressed this issue. However, it is worth mentioning that there is no unanimity on the meaning of the term "origin of individuals". The most popular choices are to take as origin either the nationality or the place of birth. A different approach has been followed, for instance, in the USA, to project Hispanic-origin population.

The choice of one definition or another is mainly motivated by the data available and also on the plausibility of identifying demographic clusters.

Subpopulations

The arrival of immigrants in recent years explains that, although the vegetative growth has been moderate, the increase in population in Andalusia has attained its highest records. This phenomenon is not only seen in Andalusia, since the process has been even more intense in other regions in Spain. Moreover, the immigrant population has different demographic patterns. This motivates the need of a detailed analysis of this population group.

Table 1. Population in Andalusia and Spain. 1900-2007.

| Census	Population (thousands)		Total growth (thousands)		Annual growth rates (‰)		Natural growth (thousands)	
	Andalusia	Spain	Andalusia	Spain	Andalusia	Spain	Andalusia	Spain
1900	3.545	18.618						
1910	3.800	19.996	256	1.378	7,0‰	7,2‰		
1920	4.222	21.390	421	1.394	10,6‰	6,8‰		
1930	4.627	23.678	405	2.288	9,2‰	10,2‰		
1940	5.254	26.016	627	2.338	12,8‰	9,5‰		
1950	5.647	27.977	393	1.961	7,2‰	7,3‰	591	
1960	5.940	30.529	293	2.552	5,1‰	8,8‰	871	3.348
1970	5.991	34.041	51	3.512	0,9‰	10,9‰	922	3.905
1981	6.441	37.683	450	3.642	7,1‰	10,0‰	745	3.554
1991	6.941	38.872	500	1.189	7,5‰	3,1‰	462	1.466
Padrón 2001	7.404	41.117	463	2.245	6,6‰	5,7‰	233	300
Padrón 2009	8.303	46.746	899	5.629	14,4‰	16,2‰	212	667

As mentioned above, several Statistical Institutes have started to distinguish groups with different patterns for fertility, mortality or mobility. It is customary assumption (not always made explicit) that such patterns will disappear or will be reduced with time. In some cases even the demographic pattern of second generations is considered.

A feature which plays a central role for planning population projections by place of birth or nationality is how many groups should be distinguished. The answer is far from trivial as it requires a balance between groups which are big enough provide a wide sample and groups whose members share similar behavior patterns.

In our population projection system five groups were chosen based on their place of birth. Both population structure and demographic behavior of those five groups were unique to their particular group.

As shown in Figure 1, the EU15 population which settled in Andalusia has a peculiar age structure with two local maximums, one around the age of 35 and a second one at retirement age. The three other pyramids show a strong inclination for people between 20 and 40 years of age and exhibit noticeable gender differences. Male Andalusian population coming from Africa counts for twice their female counterparts. On the contrary, females comprise the majority of those coming from Latin America.

Figure 1. Population pyramids by place of birth. Andalusia 2006
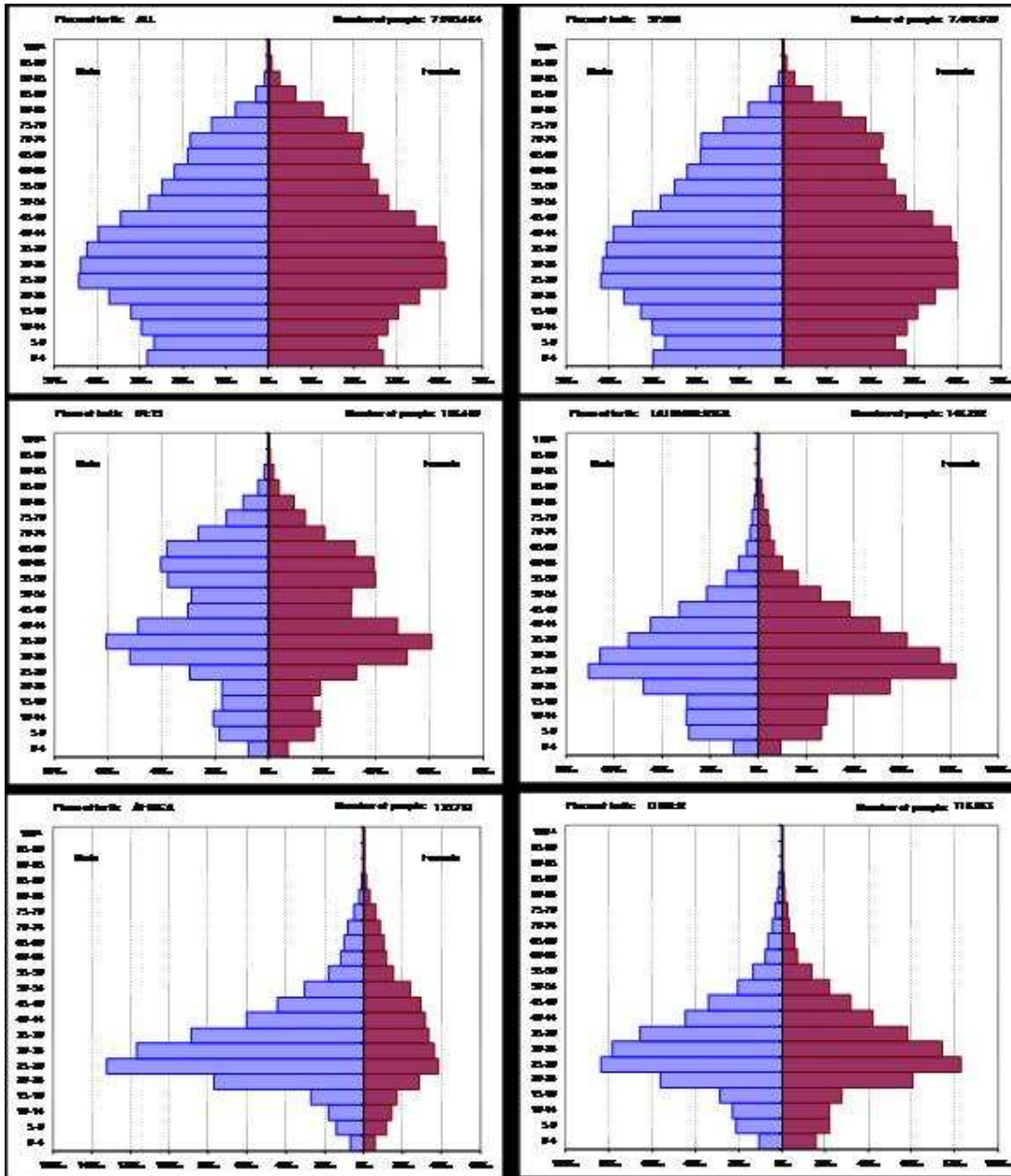
Why not choosing different criteria such as nationality to identify population groups? The election depends on several factors, mainly the capability to distinguish population groups whose demographic behavior is homogeneous within groups and differs between them. Another important factor is data availability.

In Spanish demographic data sources it is more likely to record nationality than place of birth. Being so, what persuaded us to use place of birth as criteria? Nationality is something that might change over time, and that generates a few drawbacks:

1. First, had we chosen nationality, additional assumptions on future naturalizations would have been required? And naturalizations logicae relies more on legal and administrative rules rather than different demographic behaviors.

2. What nationality should we assign to the offspring of foreign citizens? The answer is not easy and requires additional questioning. Are both parents foreigners? That being the case, where exactly are they from? Moreover, the child would be given the Spanish nationality if he or she remains stateless otherwise. Thus,

consistent assignment of nationalities demands additional hypothesis on those fields. Moreover, both parents should be taken into account to study fertility patterns instead of the traditional maternal-based philosophy.

It is interesting to note that other origin-based projections such as US race projections face similar complexities: which race should we assign to future babies? The answer requires information from parents´ races and parents´ likeliness to marry and/or procreate with other races[1].

3. Finally, as nationality might change over time, renewable phenomena such as migrations and fertility could experience unexpected changes.

For instance, a mother could have her z+1 child and hold a different nationality than the one she had when her z child has born. In contexts where naturalizations are large, it might mean unexpected changes in fertility patterns.

Finally, it must be acknowledged that both nationality projecting and place of birth projecting are bound to set hypothesis on naturalized population behavior. When choosing nationality, we are assuming that demographic behaviors change together with nationality. Choosing place of birth as criteria implies that demographic behavior is fixed once born.

Nonetheless, not distinguishing groups within population sets a much more convoluted hypothesis; namely that demographic behaviors are the same regardless of a person´s origin.

2.   DEMOGRAPHIC PHENOMENA

Fertility

Changes in Andalusian and Spanish fertility patterns are similar to the ones recorded in other European countries, though changes were more drastic in Andalusia (and so in Spain) and they began years later.

Figure 2. Fertility indicators in Andalusia, Spain and European Countries. 1950-2008
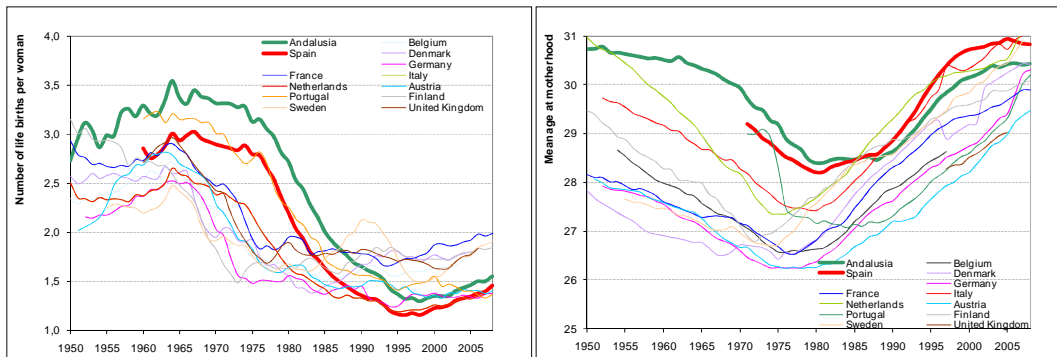
Immigrants fertility is greater and it starts sooner than 'native' ones. Moreover, the number of immigrants of childbearing age is considerably high and consequently, their contribution to the total number of births surpasses its population weight[2].

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[1] Assignment of race faces additional draw-backs, due to its subjectivity. A clear example comes from Colombia: in 1993 census only 1,5% of population were recorded afro-colombians. Next census, held in 2005, recorded 10,5% instead.
[2] Nonetheless, immigrant contribution to TFR is not that big. Such a surprising result is due to immigrant´s age profile: the ages with higher immigrant fertility are ages with a relative scarcity of immigrant women, as it was shown in Figure 3

Figure 3. Fertility patterns and childbearing age population on the base year
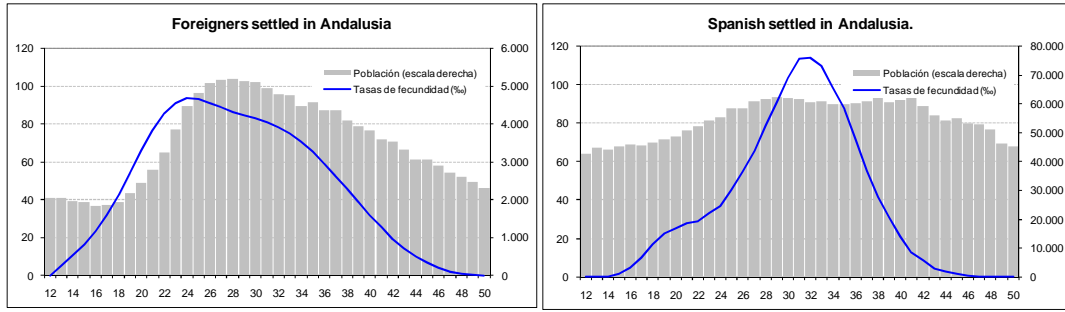

$$TFR_t^{Tot} = \alpha TFR_t^{Immig} + (1 - \alpha)TFR_t^{Natives}$$

$$\alpha = \frac{TFR_t^{Tot} - TFR_t^{Natives}}{TFR_t^{Immig} - TFR_t^{Natives}}$$

But immigrant population is a heterogeneous crowd. For instance, fertile behavior of EU15 mothers settled in Andalusia is close to Spanish women, while number of births per woman is higher among the other groups. Such diversity of fertility patterns reinforces us to distinguish sub-populations.

Figure 4. Fertility rates and fertility calendar. Base year.
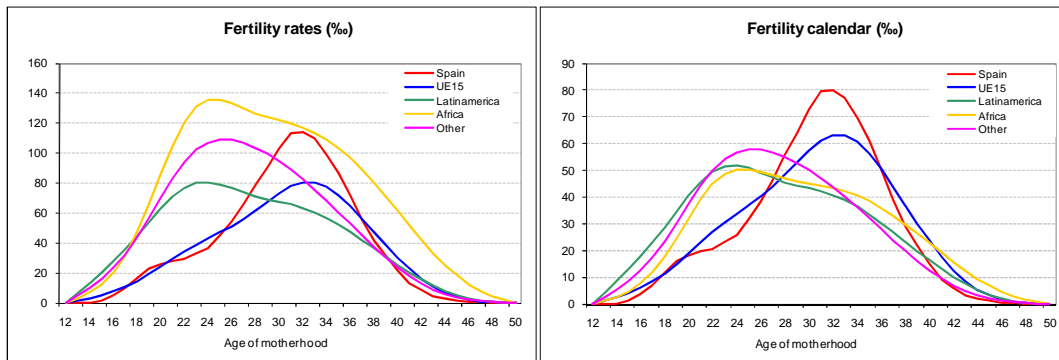
The methodology used to obtain future fertility rates is based on a parametric model which sets as parameters the TFR (total fertility rate) and MM (mean age at motherhood) [3].

Mortality

Mean life duration has experienced a dramatic increase in Andalusia during the last century. As shown in Figure 5, life expectancy at birth showed an ever-increasing trend, with two temporary dips due to the so-called 'Spanish flu' (1918-1919) and the Spanish Civil War (1936-1939).

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[3] A detailed description is available at IEA website: http://www.iea.junta-andalucia.es/proyecc/index-en.htm

Figure 5. Life expectancy at birth and life expectancy at the age of 65.
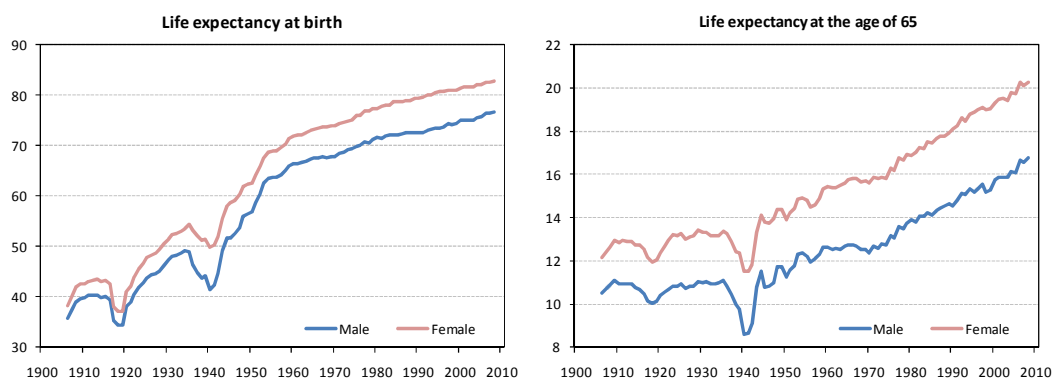
Based on the projection scope, we assumed the life expectancy trends in Andalusia to continue. No doubt, it is the most reasonable hypothesis given the series known performance. Nonetheless, two comments are advisable:

-   First, there are historical examples of decreases in life expectancy. Certain countries in Eastern Europe and Africa suffered huge decreases in life expectancy in recent years, which suggests that under certain circumstances (armed conflicts and political crises in particular) a sharp decline in health might arise.

    Although a sharp dip in life expectancy probably will not occur, it is more likely that there will be gradual decrease in progress due to new environmental damages, unhealthy diets, or antibiotic resistance. For this reason, our 'low-growth' long-term scenario slows down the life expectancy enhancement trend.

-   Besides, as the life expectancy nears the human life biological limit (whatever it might be) a slowdown could be recorded as marginal improvements would become increasingly difficult to overcome.

    But where to place such a biological limit? This is the major clue at hand to project long-term mortality rates, and there are heated medical controversies about. Some researchers state the limits are nearby (Olshansky, 1990). Other researchers believe life expectancy will continue to rise, reaching up to 115-120 years which are the longest lives ever recorded (Vaupel, 1996). Finally, there are a few researchers which place human kind at the verge of a medical revolution against genetic ageing itself which might mean an even greater limit (de Grey, 1999).

Moving on to differential place of birth mortality, it is not clear -nor easy- to evaluate whether immigrants hold a different mortality pattern to 'natives'. On the one hand, a clear positive correlation exists between income and health status. As immigrant income is significantly below the mean Andalusian income, an above-the-mean morbility and mortality pattern for immigrants might be expected. On the other hand, emigration process selects healthy individuals and that points in the opposite direction, to below-the-mean morbility and mortality patterns of immigrants.

Moreover, as shown in Figure 1, Andalusian immigrant population is strongly concentrated between 20 and 45 years of age, ages with a very low likeliness to die. In 2008 foreign-born population accounted for 3% of the total number of deaths in Andalusia –half of them from EU15 countries- while their share on population amounts to 8%. Under those circumstances, it wouldn´t be reliable to specify a specific model for each group.

Research developed in countries with long immigration tradition is not conclusive either. For instance, latino mortality in the US is found to be lower than the medium US citizen (Abraído-Lanza, 1999). Why so? A key factor to explain this is the so-called 'salmon bias': latinos are likely to go back to their home countries when they get ill. Thus, immigrants are less likely to be recorded dead but just as returning emigrants. Research developed elsewhere is not conclusive either and sometimes points to below-the-mean immigrant life expectancy (Deboosere, 2005 & Bos, 2004). Therefore, at the Statistical Office of Andalusia we did not specify a different mortality pattern among immigrants.

Migrations

Migrations represent a key factor in Andalusian recent demographic development. It would be impossible to approach Andalusia recent history without tackling migration phenomenon. Andalusia lost more than a million inhabitants during the period 1950-1975, due to its net migration sign.

After that period net migrations stabilized reaching negligible values. It is only in recent years, from late nineties, that net migrations have recovered its importance due to a tremendous increase in international immigration flows.

Migration is known as the most volatile demographic phenomenon and therefore the most complex to deal with when forecasting. Besides, migration analysis presents other limitations. Firstly, the migration´s information quality is significantly worse compared to other phenomena (births and deaths are perfectly tracked by the Statistical bulletin

provided by the Official Civil Register). Secondly, we should distinguish within phenomena based on the direction of the flow and the geographical scope (i.e: internal & external, in - out migration).

At the Andalusian Statistical Institute we usually distinguish five groups of migration movements, and we have done so in our current sub-national and foreign-born population projections:

- Inter-provinces migrations, between Andalusian provinces
- Emigrations from Andalusia to other Spanish regions
- Immigrations from other Spanish regions to Andalusia region
- Emigrations from Andalusia to foreign countries
- Immigrations from foreign countries to Andalusia

Besides, migration analysis requires splitting the analysis into several categories depending on migrant's origin and destination.

Therefore, in order to develop an analysis of mobility by place of birth, we added an extra dimension related to past place of residence, resulting in a significant increase in the number of demographic sub-phenomena to analyze.

4.   RESULTS

We would like to briefly introduce the 4 key conclusions obtained from our projections:

1. First, population in Andalusia will continue growing in the coming years, due to its natural growth potential. The low fertility balances out due to the young demographic structure of Andalusian population, resulting in positive natural growth. Nevertheless, in the long term population will decrease as young populous cohorts get older.

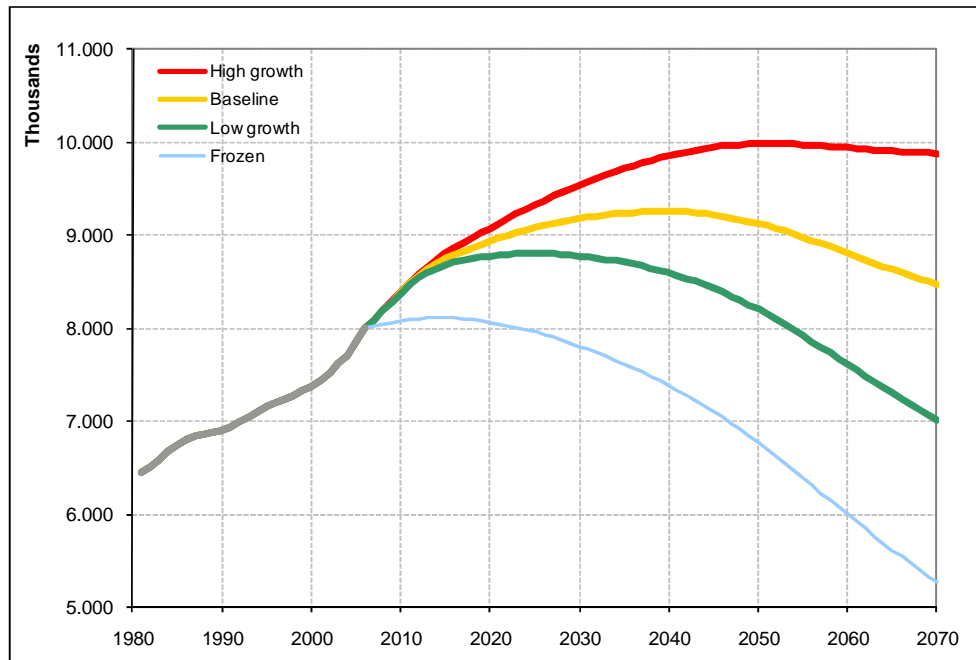Figure 6. Population & population projections in Andalusia. 1981-2070.

Table 2. Projected population in Andalusia. 2006-2070.

	2006	2010	2025	2050	2070	Max. Year	Max. Value
High grow th	7.995.464	8.397.688	9.325.403	9.978.712	9.878.831	2051	9.979.904
Baseline	7.995.464	8.389.270	9.081.244	9.121.016	8.466.562	2039	9.251.974
Low grow th	7.995.464	8.379.598	8.802.420	8.196.691	7.011.851	2025	8.802.420
Frozen	7.995.464	8.074.284	7.954.634	6.768.813	5.267.768	2014	8.106.595

2. Second, the number of births will decrease even in the case of significant increases in fertility rates. The baseline scenario dates the drop in fertility from 2010.

   Therefore, we may witness growth in fertility rates in the coming years, but the total number of births will certainly fall as the tiny 80's and 90's cohorts reach the childbearing age.

Figure 7. Births & projected births. Andalusia. 1990-2025.
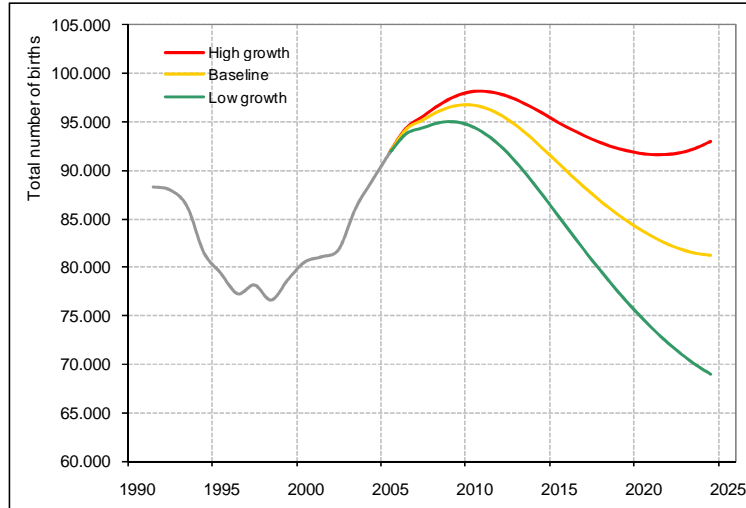
3. Currently we observe a high trend towards population ageing.[4]. In 2050 –according to baseline scenario- the proportion of population over 65 years would reach 29,1% and 9,8% the proportion of population over 80 years (compared to 14,2% and 3,4% nowadays). In other words, the ratio of labour-force population to retired population would change dramatically from 4,6 in 2006 to 1,9 in 2050.

Figure 8. Projected population by age group.

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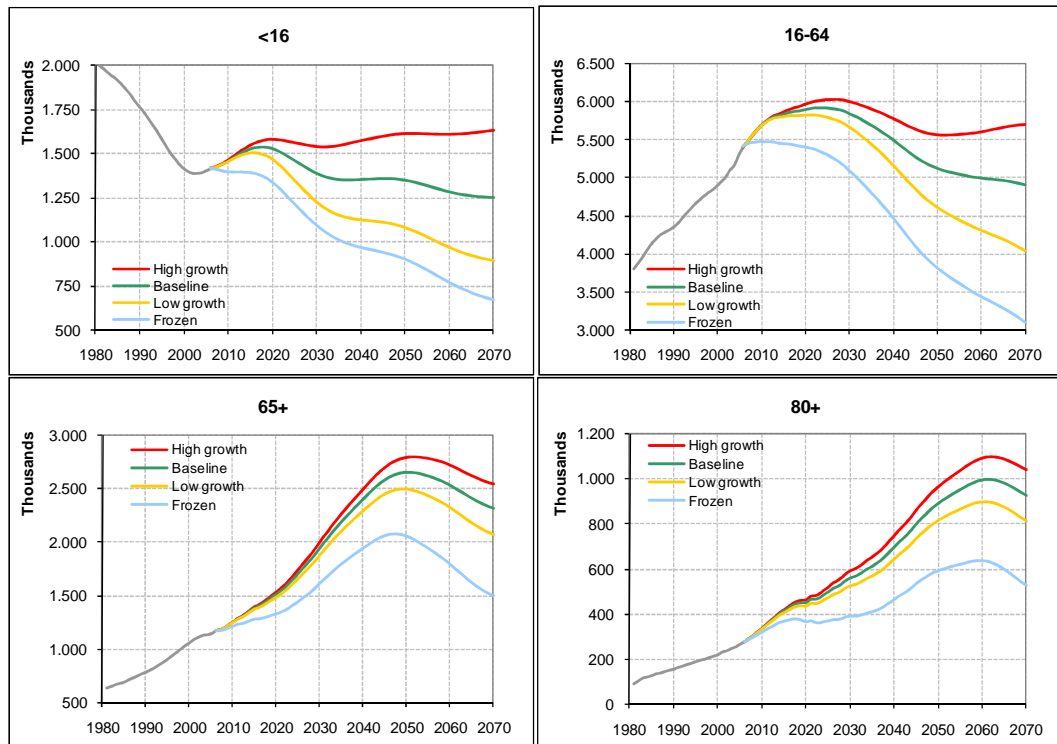
[4] We should think about what we mean by ageing. In a situation where life expectancy and free-disabilities life expectancy are growing, static indicators may become meaningless. E.g.: static indicators such as the proportion of population over 65 hide the fact that this group of population in 2008 is physically and psychologically different from their counterparts in 1950. Despite this remark we have used static indicators in order to measure population ageing in our projections.

4. Finally, a brief comment on future foreign-born population. Foreign born population projection is likely to increase moderately in the future. This might help to cope with ageing challenges in the short run. But in the long term, immigrant population will get older too (Figure 9).

Figure 9. Foreign-born population figures and age structure. Baseline scenario.
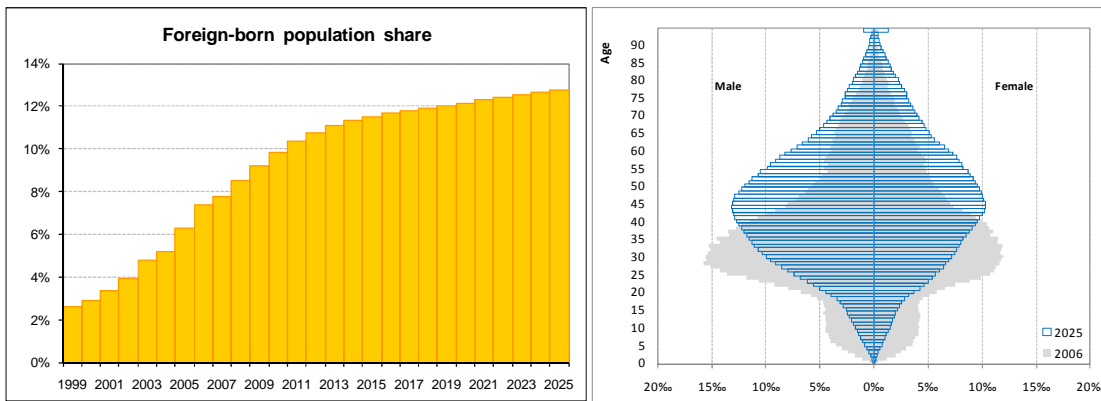
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