

Population projections 2018-2068 in Spain

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- 1) Methodology: Main characteristics**
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- 3) Results**
- 4) Scenarios**



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1. Methodology. Main characteristics

After 2016 projections, INE Executive Board decides to consider opinion from experts in the next exercise



1. Methodology. Main characteristics

In February 2018, a **working group** formed by a reduced group of experts from 5 different institutions was established in the proposal of methodological improvements.

Conclusions:

- Hypothesis will make distinction by place of birth instead of citizenship
- Fertility. Future rates will be adjusted to a known beta function, establishing hypotheses about evolution of total fertility rate (TFR) and the average age at maternity (AAM).
- Mortality. It is proposed a projection based on the general level, synthesized by the life expectancy at birth and establishing hypotheses about the future evolution of this parameter.
- Migration. Divide the projective period into four different periods in which the trend of the last years will be reflected at a first moment and then will evolve towards levels established as hypotheses to 15 and also to 50 years.

1. Methodology. Main characteristics

In May 2018, a **survey** was sent to a group of 47 demographic experts.
23 answers were received

Questions:

- TFR about people born in Spain in the next 15/50 years
- TFR about people born abroad in the next 15/50 years
- Average age at maternity about people born in Spain in the next 15/50 years
- Average age at maternity about people abroad in the next 15/50 years

- Life expectancy at birth about men/women in the next 50 years

- Immigrants born in Spain in the next 15/50 years
- Emigrants born in Spain in the next 15/50 years
- Immigrants born abroad in the next 15/50 years
- Emigrants born abroad in the next 15/50 years

2. Methodology. Detail by demographic phenomenon

Cohort-component method

$$P_t = P_{t-1} + B_{t-1,t} - D_{t-1,t} + M_{t-1,t}$$

Where:

P_t = population at time t;

P_{t-1} = population at time t-1;

$B_{t-1,t}$ = births in the interval from time t-1 to time t;

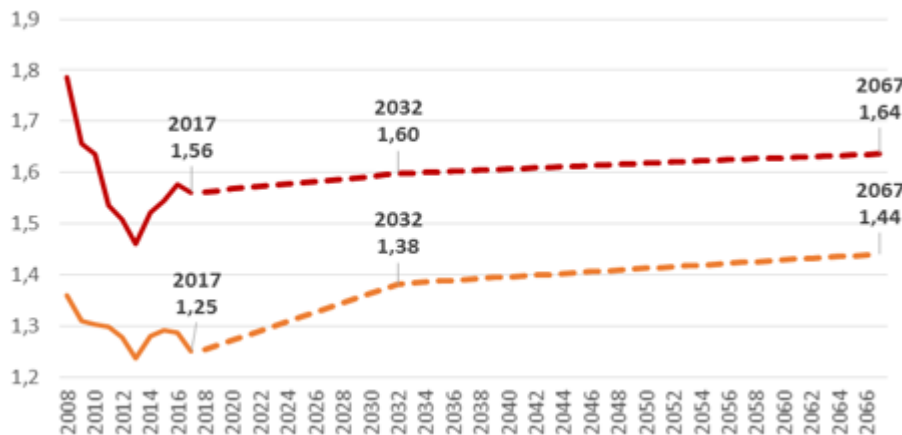
$D_{t-1,t}$ = deaths in the interval from time t-1 to time t; and

$M_{t-1,t}$ = net migration in the interval from time t-1 to time t

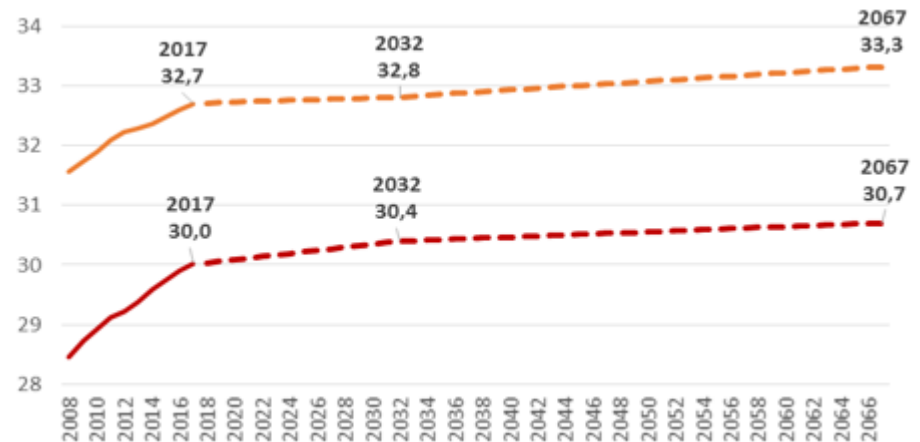
2. Methodology. Detail by demographic phenomenon

Fertility

- Projected separately depending on the place of birth of the mother
- Each $t > 2017$, $TFR^t_n \rightarrow$ lineal interpolation of $TFR^{2017}_n, TFR^{2032}_n, TFR^{2067}_n$
- Each $t > 2017$, $AAM^t_n \rightarrow$ lineal interpolation of $AAM^{2017}_n, AAM^{2032}_n, AAM^{2067}_n$
- Each $t > 2017$, $Var(AAM^t_n) = Var(AAM^{2017}_n)$



TFR



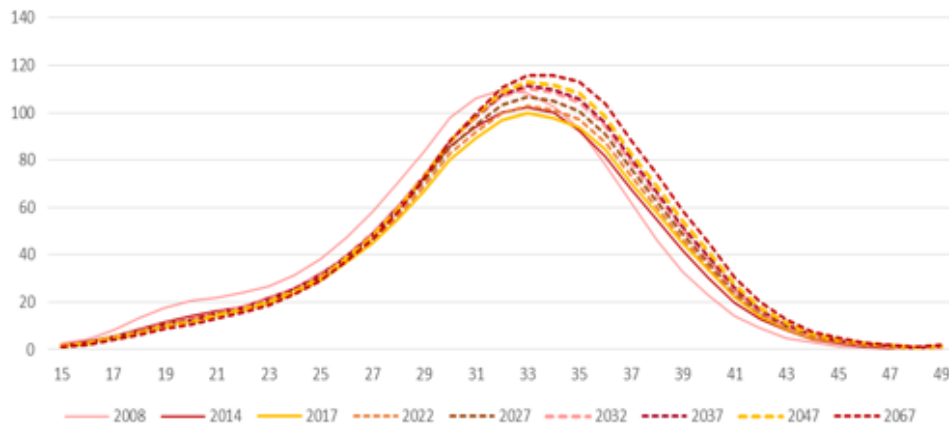
AAM



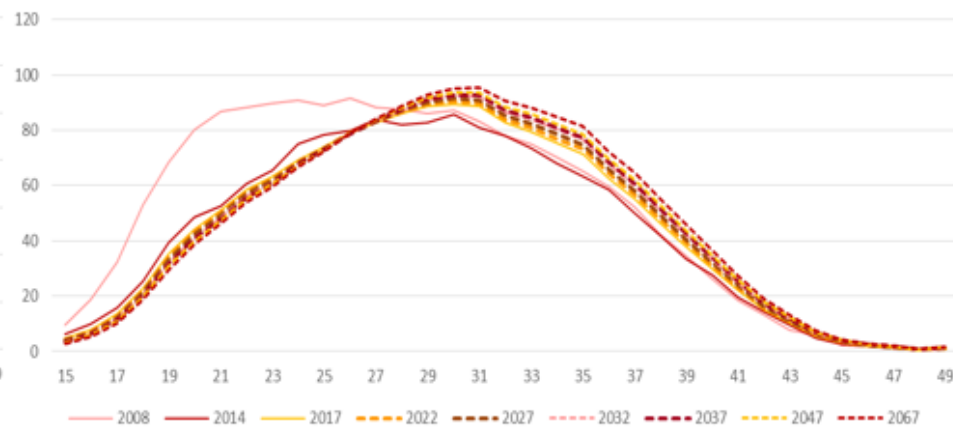
2. Methodology. Detail by demographic phenomenon

Fertility

- Each $t > 2017$, $\text{Beta}(\text{TFR}_n^t, \text{AAM}_n^t, \text{Var}(\text{AAM}_n^t))$
- Age Specific Fertility Rates (ASFR): observed and projected



Born in Spain



Born abroad

- Regional level → Brass-Gompertz model



2. Methodology. Detail by demographic phenomenon

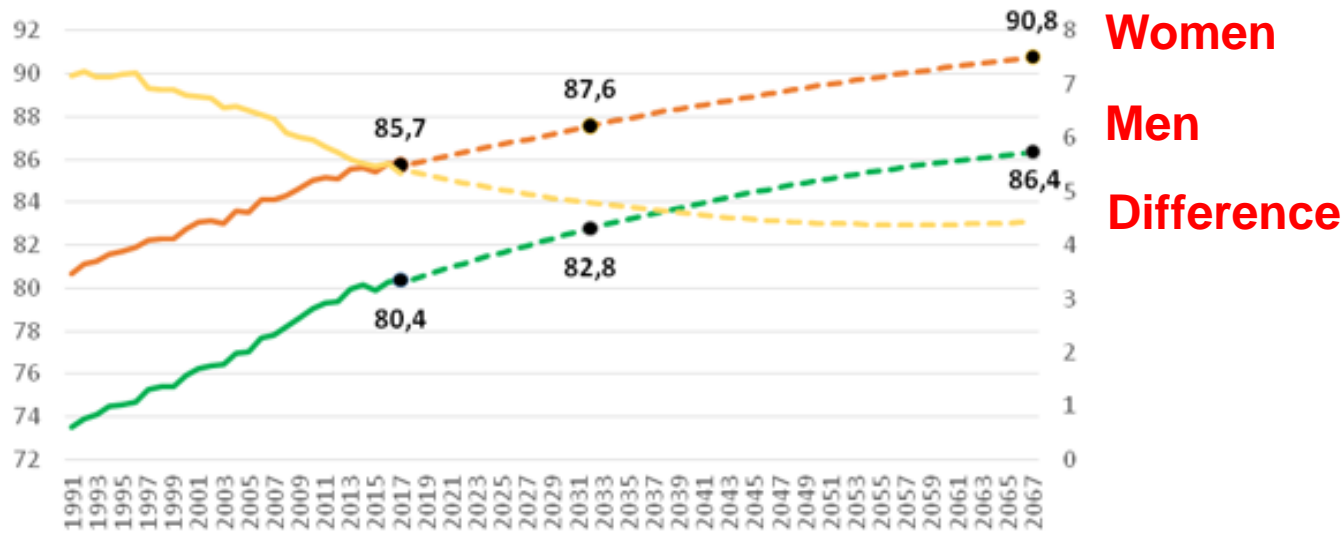
Mortality

- No distinction between place of birth. Very few deaths of people born abroad.
- Distinction between sex
- It is proposed to a projection based on the general level (logit function from World Bank), synthesized by the life expectancy at birth.
- Then, mortality tables (first probability of death at a certain age q_x and coefficient of distribution of the deaths a_x , then the other parameters) are derived following the values of established model tables.

2. Methodology. Detail by demographic phenomenon

Mortality

- Life expectancy: observed and projected



- Regional level → Logit of Brass model



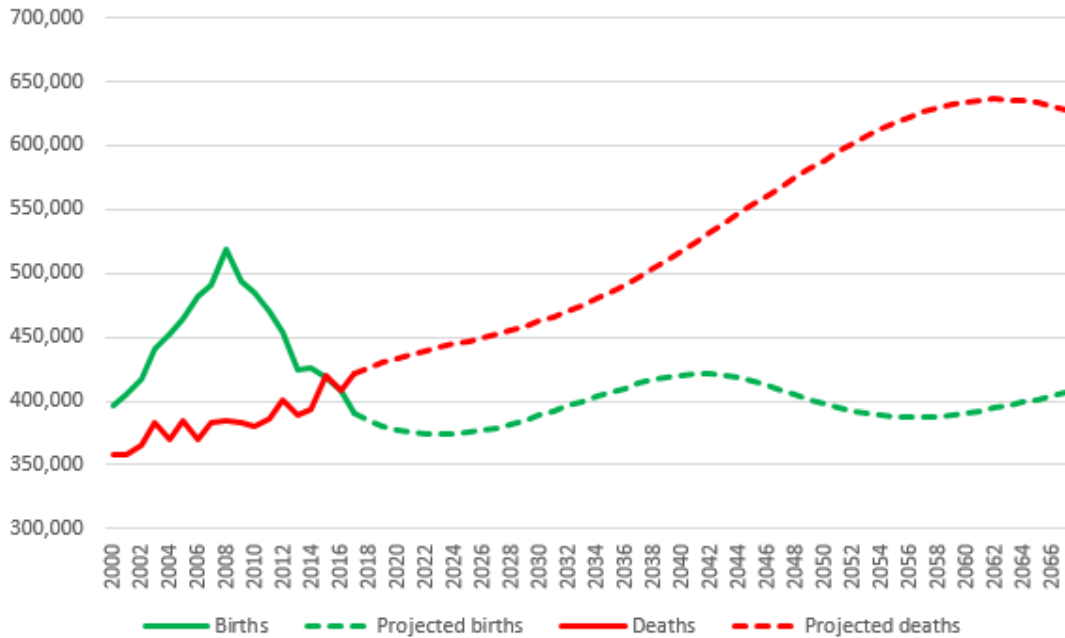
2. Methodology. Detail by demographic phenomenon

Migration

- Distinction between place of birth.
- Four different periods
 - ✓ First year: Nowcast estimation
 - ✓ Years 2-4: Observed trend
 - ✓ Years 5-15: Evolve to first reference point provided by experts
 - ✓ Years 16-50: Evolve to second reference point provided by experts
- Distribution according the rest of variables (sex, age, region) will be based on the information of the average last 5 years of Migration Statistics and will remain as constant.

3. Results

Births and deaths: Observed and Projected

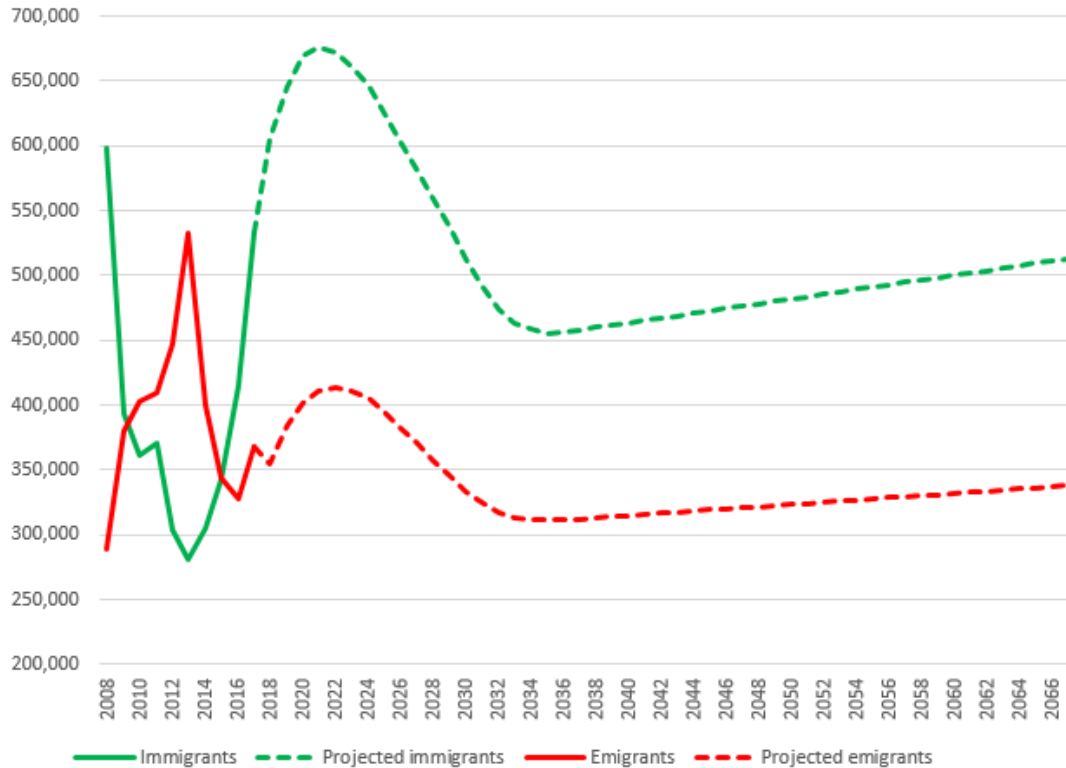


- Births would fluctuate very little.
- Deaths would show a mainly ascending behaviour



3. Results

Migration: Observed and Projected

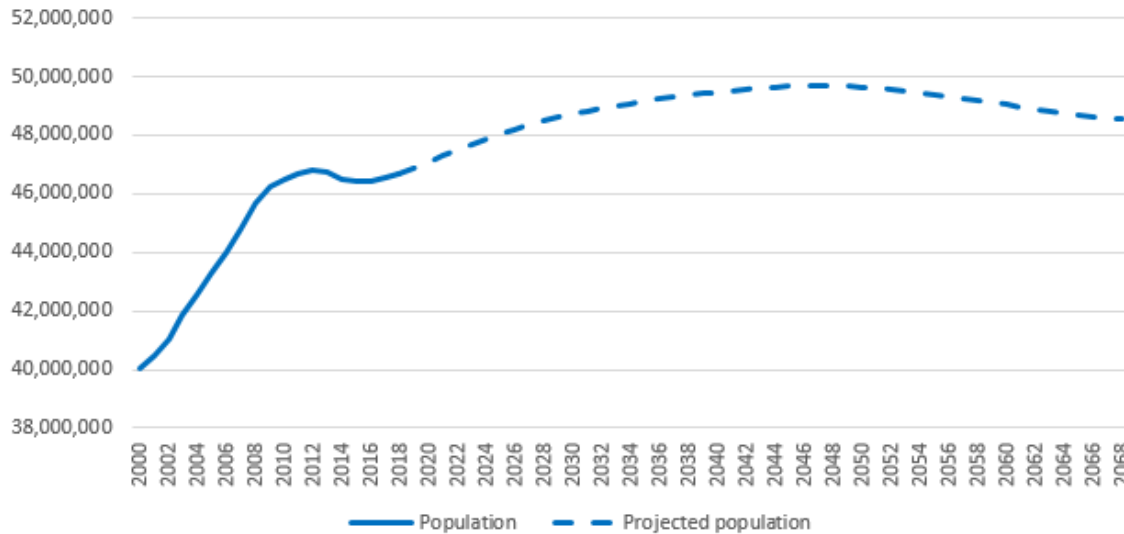


Spain would have a positive accumulated migration balance of more than 3.4 million in the next 15 years and almost 9 million in the next 50 years.



3. Results

Population: Observed and Projected

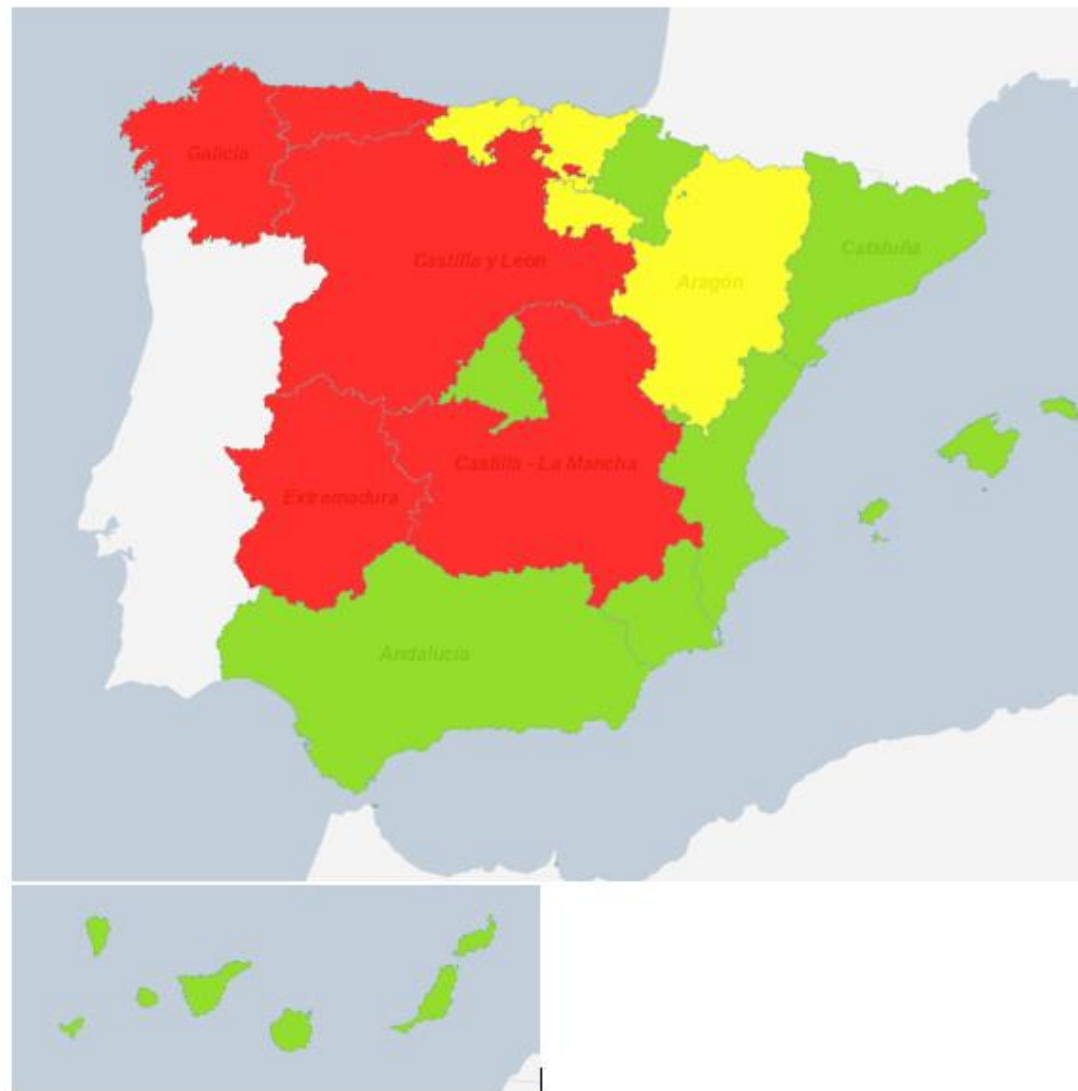
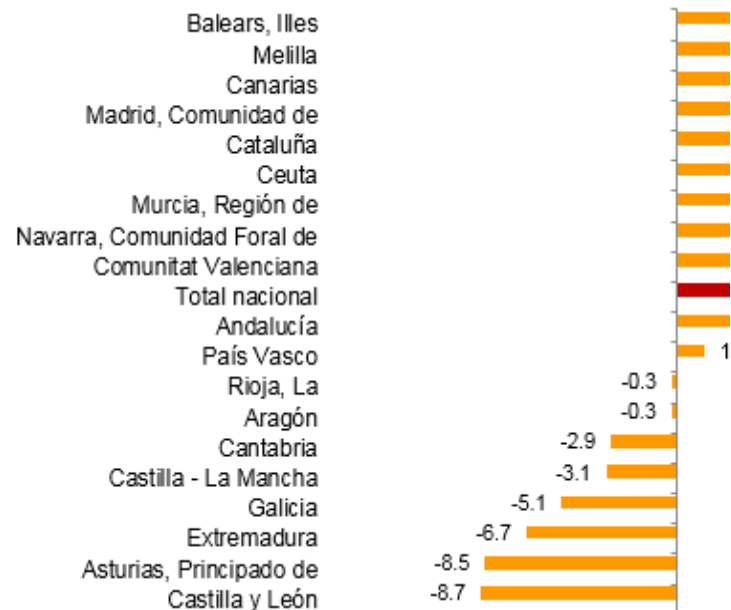


- The Spanish population figure would increase to a maximum of 49,682,732 people that would occur in the year 2047 and then descend smoothly.
- Although in absolute terms the population would not change much, the same situation would not happen with its **structure**.
 People under 16 years of age would descend from 7.4 million to 6.5 million in 2033
 People aged over 64 would increase from 9.0 million in 2018 to 14.3 million in 2068



3. Results

Regional results



11 regions of Spain will see their

Greatest relative increases in the Community of Madrid.

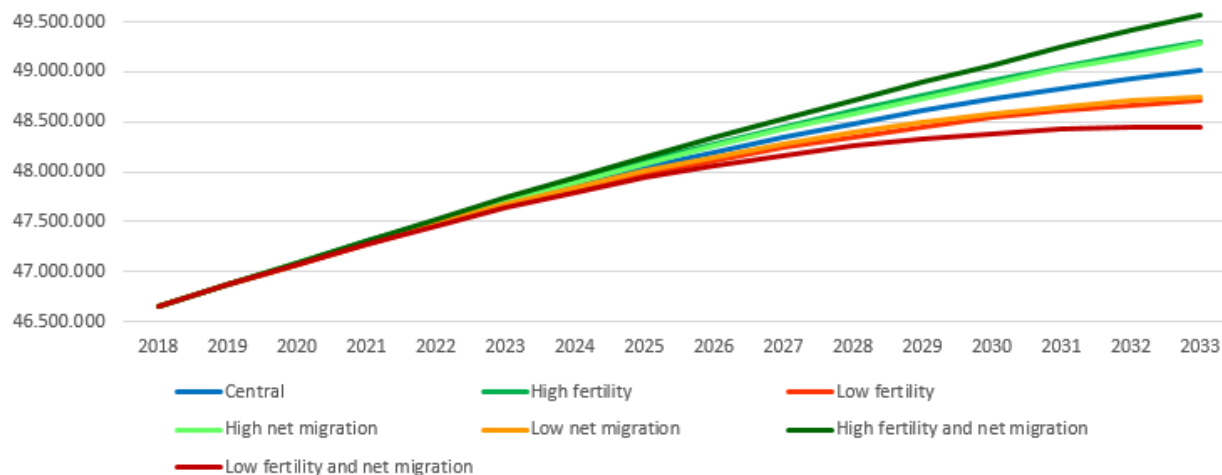
Greatest decreases in Castilla y



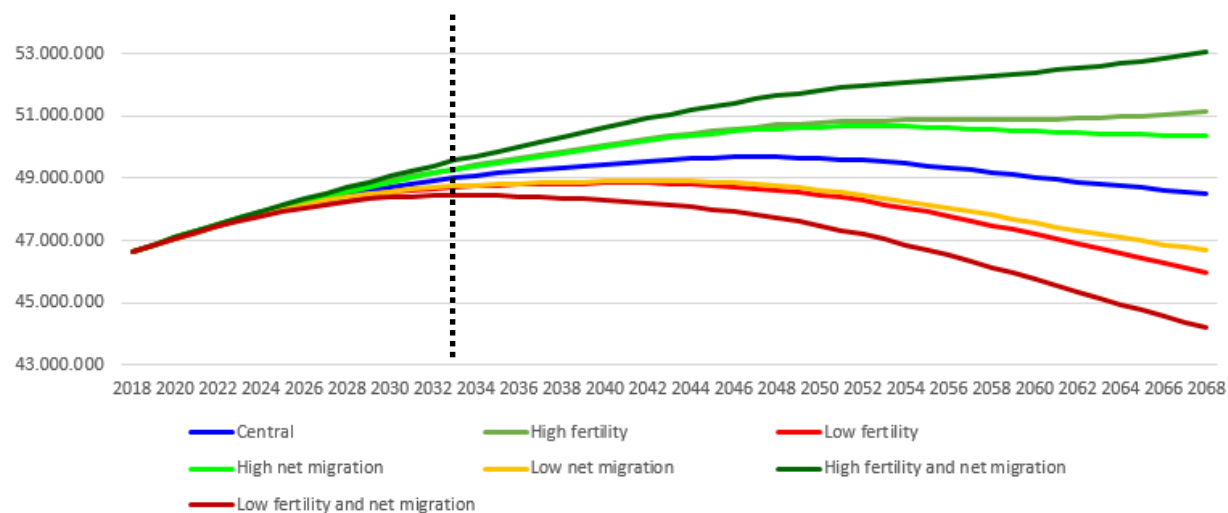
4. Scenarios

- Sensitivity analysis
- 8 scenarios. Modification of hypotheses
 - ✓ **High** fertility. TFR increased by twice the standard deviation (central scenario)
 - ✓ **Low** fertility. TFR decreased by twice the standard deviation (central scenario)
 - ✓ **High** migration. Immigrants +5%. Emigrants -5%
 - ✓ **Low** migration. Immigrants -5%. Emigrants +5%
 - ✓ Combination of **high** fertility and **high** migration
 - ✓ Combination of **low** fertility and **low** migration
 - ✓ Central
 - ✓ Zero migration. Nobody enters or leave the country
- Uncertainty increases in the medium and especially in the long term →
Caution in the interpretation of the results

4. Scenarios



15 years
Gap=1M



50 years
Gap=9M



Thank you very much for your attention

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