01140 - REGIONAL COMPARATIVE OF SPAIN THROUGH ECONOMIC AND DEMOGRAPHIC INDICATORS (1975-2017)

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Abstract. Spain is a country known as a "State of Autonomies" because regionalisms are very strong and with different characteristics. This country is administrative divided in 17 Autonomous Communities and two Autonomous Cities in Africa (Ceuta and Melilla). The administrative division for Autonomies is the same as NUTS 2. The objective of this research is to analyse the inequalities between Spanish regions for the period of 1975-2017, linking some demographic indicators (for migration, fertility and mortality) and economic indicators (as unemployment, production by sectors, economic growth and debt). The methodology is quantitative using descriptive and comparative analysis, with some econometric models of regression to analyse though a panel database. This permits to see through the main determinants for the Spanish demography. For example, one of our models can predict birth growth (explaining almost the 65% of the cases, with an 1% of error), according to the literature related to the socialization hypothesis on the fertility behaviour. The main results point out changes and differences on fertility rate, foreigners' proportion and unemployment rate. Total fertility rate decreased from 2.8 in 1975 to 1.3 in 2017. The foreigners' proportion increased in Spain from 1.6% in 1998 to 9.8% in 2017 over the total population and being the double of foreigners' proportion for all regions (except Madrid, Navarra, Ceuta and Melilla). Finally, Spain still have some huge regional differences between North-South respect to economic indicators, as unemployment rate or economic sectors.

Keywords. Spain, regionalisms, demography, panel, models

1. INTRODUCTION

This brief article is more focused on showing some results about the regional inequalities in Spain than explaining some theoretical framework. The results are part of my doctoral dissertation about the impact of business cycles on demographic dynamics in Spain.

Along this article you could know about the regional differences and their evolution during the last years. In terms on demography, it will be shown natural balance, foreign population, middle ages of maternity and fertility rates. Also, you could read some inequalities through economic indicators as unemployment rate, GDP by economic sectors in Spain and public debt. It is important to highlight the econometric model that we have tested with the database to national level for Spain.

2. OBJECTIVES AND METHODOLOGY

The methodology for this research is quantitative. It was made a descriptive and comparative analysis between regions and we also create an econometric model of regression. The period for this research is from 1975 to 2017, which was chosen according to digital availability of data serial.

The main sources are from Official Data as World Bank Data, Eurostat or Spanish National Institute of Statistics (S.N.I.S.). One of the best advantages is that the Administrative and Statistical Division of Spain is the same as NUTS2. The main goals for this presentation were:

- to analyse the inequalities between Spanish regions (Autonomous Communities) for the period 1975-2017;
- to observe the main differences between Autonomous Communities in Spain, looking at some demographic indicators (for migration, fertility and mortality) and economic indicators (as unemployment, production by sectors, economic growth and debt).

2.1 Variables and databases

Several variables were chosen from demographic and economic indicators (see table 1). Every data serial was recorded in 2 ddatabases: one with data for national level (NUTS1) and other for regional level (NUTS2), which is a Panel Data.

Table 18. Demographic and economic indicators

Demographic indicators	Economic indicators
Life expectancy at birth	GDP
Total Fertility Rates	GDP by economic sectors
Natural Balance (Birth & Death Rates)	GDP *per cápita*
Proportion of Foreign Population	Unemployement Rates
Middle Ages of Maternity	Debt *per cápita*
Index of Aging	Debt (%GDP)

Source: own elaboration.

Panel data are part of a set of individuals (in our case, 17 Autonomous Communities and 2 Autonomous Cities that form Spain) observed in the period 1975-2017 (Carter Hill et al, 2012), so the dependent variable would be explained by the next form:

$$y_{it\,\cdot} = a + bX_{it\,\cdot} + \varepsilon_{it\,\cdot}$$

* where $y_{i\,\cdot}$ express to the individual (Autonomous Community) and $y_{t\,\cdot}$ express the period (year) observed.

The variables with data serial were recorded in annual differentials. Variables in differentials are used to see real correlations and to avoid spurious regressions in econometric models. Yule (1926) was the first scientist that mentioned the idea about spurious regressions wondering why sometimes meaningless relationships between time series were achieved. More recently, as mentioned Carter Hill et al. (2012), two highlighted scientists in econometrics, got Nobel Prizes in 2003 by their contributions to deal with these correlations: Clive W.J. Granger (1974) and Robert F. Engle III (1982).

3. RESULTS

One of the realities and challenges in Spain is the aging population. Through the natural balance data (births less deaths), we could see that the regions with negative natural balance have increased or sharpened during the last years. The regions with negative natural balance in 2007 were in the northwestern (Asturias, Galicia, Castile-Leon and Cantabria), Extremadura at south and Aragon at the northeast. During 2009, Asturias decreased the natural balance, although still staying negative, and it became positive for Cantabria. It can be due to the immigration during the economic expansion, because in 2013 those regions became to the same situation that in 2007, including a negative balance for Basque country too. Analyzing the data for 2016, three regions became a negative natural balance (La Rioja, Castile-La Mancha and Valencian Community) and Ceuta decreased its positive natural balance. You can see, in the table 2, the three best regions and the three worst regions according to the natural balance results for 2017.

Table 19. Regional inequalities by demographic indicators in terms of positive and negative aspects according to last year

Last data	Positive +	Negative -
Natural Balance (2017)	Melilla (10.0) Ceuta (5.7) Murcia (2.4)	Asturias (-6.9) Castile-Leon (-5.6) Galicia (-5.0)
Percentage of foreigners (2017)	Balearic Islands (19.3%) Canarias (13.7%) Murcia (13.6%)	Extremadura (2.9%) Galicia (3.4%) Asturias (3.8%)
Fertility Rate (2017)	Melilla (2.5) Ceuta (1.8) Murcia (1.6)	Asturias (1.0) Galicia (1.1) Canary Islands (1.1)
Middle Ages of Maternity (2017)	Melilla (30.6) Ceuta (31.1) Murcia (31.3)	Basque Country (32.9) Galicia (32.8) Madrid (32.7)

Source: S.N.I.S., own elaboration.

The second demographic indicator to analyse the regional inequalities in Spain is the foreigners' proportion, which has increased in Spain from 1.6% in 1998 to 9.8% in 2017 over the total population. We see that the highest foreigners' proportion in 1998 was concentrated in touristic areas as Balearic Islands (4.8%), Canary Islands (3.4%), Valencian Community (2.5%), Ceuta (4.3%) and Melilla (4.1%) because of the borders with Africa and Madrid (2.3%) as the main city and capital in Spain. If we look at the evolution of foreigners by regions from 1998 to 2017, we can realise that the foreigners' proportion increased unless the double for any region (except Ceuta, where the increase was more stable).

During the last years, we see that immigrants are concentrated on the Mediterranean coast (where there is a huge amount of retired immigrants and tourists) and on the Autonomous Cities in Africa (in specific Melilla, that is more far than any part of Spain and closer to other countries in Africa). By the opposite way, Spanish regions with less percentages of immigrants are Extremadura (2.9%) and the northern west regions of Spain: Galicia (3.4%) and Asturias (3.8%).

For the third demographic indicators, we see that fertility rate in Spain has decreased from 2.9 (1960) to 1.3 (2017), becoming to one of the lowest-low fertility countries in the world (Goldstein, Sobotka, & Jasilioniene, 2009). It is a great challenge for Spain, where the life expectancy is also one of the highest in the world. The highest fertility rates are in Melilla (2.5), Ceuta (1.8) and Murcia (1.6) in 2017. By contrast, the lowest are in the northern west regions: Asturias (1.0), Galicia (1.1). The effect of immigration into fertility rates was positive.

We also see that the middle ages of maternity is lower for foreigners than Spanish (fig.1), but the effect of immigration is not enough, because the middle age of maternity have increased. As we saw in the table 2, the differences of middle ages of maternity are not too huge, but still we find that in Basque Country, Galicia and Madrid is higher than for Melilla, Ceuta and Murcia in 2017, where the effect of immigration is also more evident.
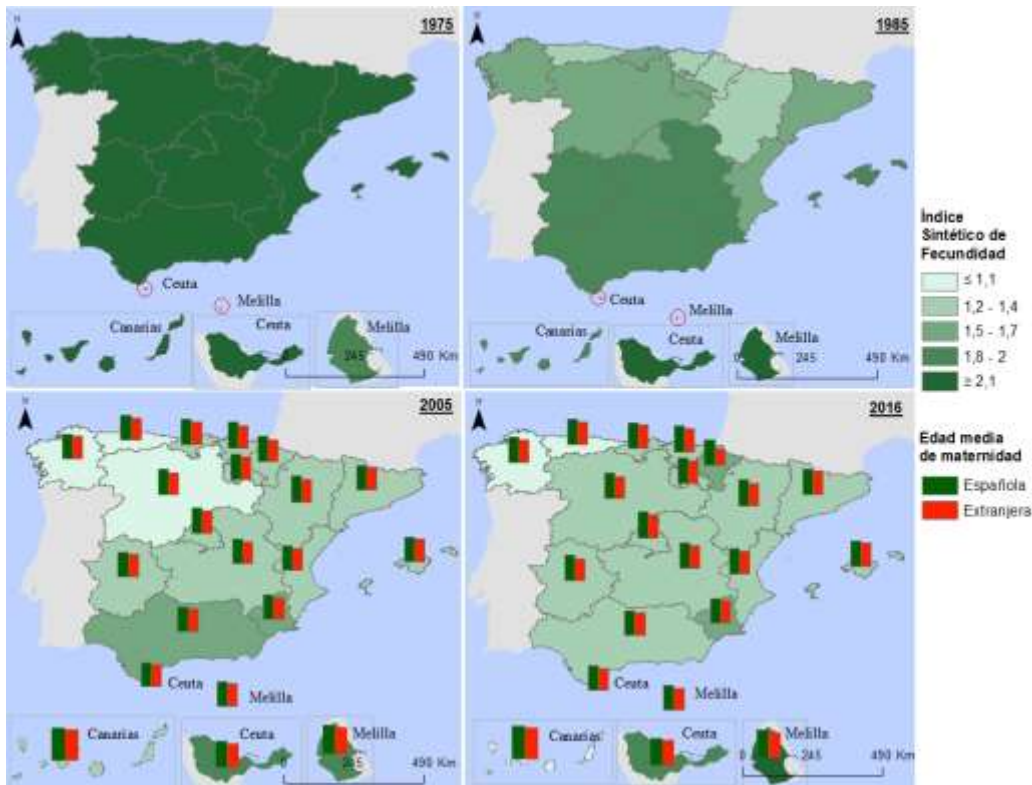
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Figure 9. Fertility rate and middle ages of maternity in Spain (1975-2016)
Source: S.N.I.S., own elaboration.

Through the fourth variables, we can observe the unemployment rates by regions in Spain, in grey colours according to the legend (fig.2). There is a high inequality for the unemployment rates in 2017 between northern regions (Navarra with 9.6% or Basque Country with 10.6%) and the south regions (as Ceuta with 26% and Melilla with 24.6% or Extremadura with 25.1%. These unemployment rates at the South of Spain are higher than the average of unemployment rate in Greece (21.5% for 2017). When we look at the figure 2, we see clearly how the economic crisis affected to almost any region for the year 2013.

In fifth place, we see some regional differences through GDP by economic sectors in the map (fig. 2). At the north, the industrial sector (marked with light green at legend) predominates more and it is almost non-existent at the south. The Mediterranean coast still produces some textile industry but the third service sector (orange colour in the graphs over the maps) is more important, especially for the Balearic Islands (which have more tourism). Spain is a country with a production model focuses on tourism (service sector) so it also happens at the southern regions, Canary Islands. Ceuta, Melilla and Madrid. The building sector (marked in yellow) increased with the building boom (look at the maps of figure 2, from 2002 to 2009) and it disappeared in 2013 due to its consequent economic crises.
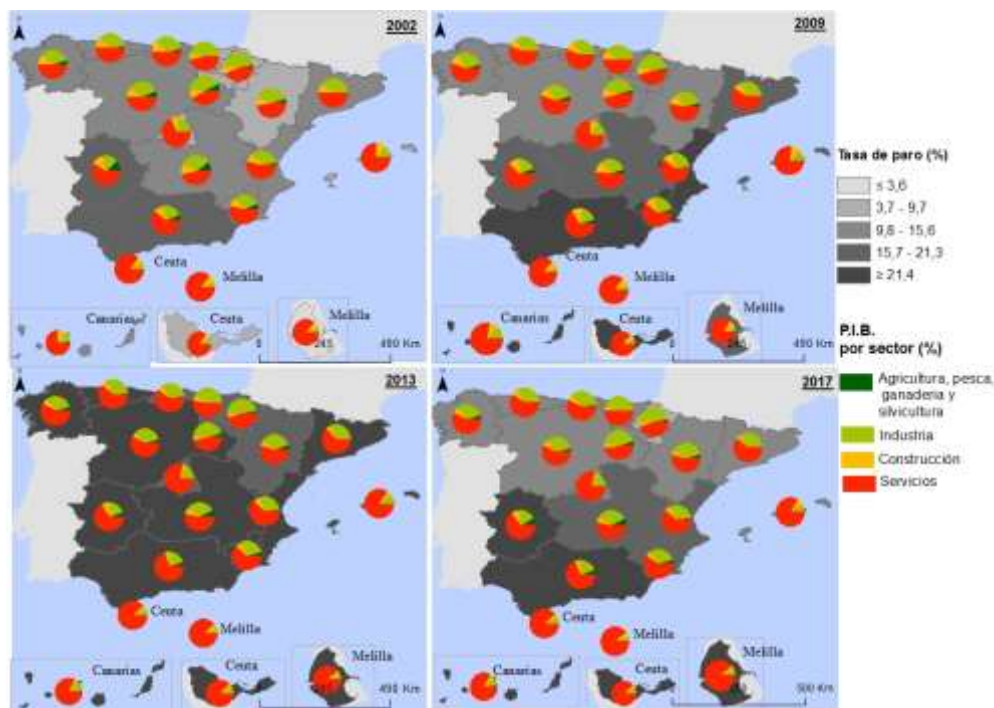
Figure 10. Unemployment rate and GDP by economic sectors in Spain (2002-2017)
Source: S.N.I.S., own elaboration.

Finally, there are some regional differences in terms of a macroeconomic indicator to define how is its production and how in debt is a region, related to GDP. Catalonia, Madrid and Andalusia are the regions with more total production of Spain; by the opposite, Melilla, Ceuta and La Rioja are smaller regions with les GDP (look at table 3). It is interesting to see that regions with more GDP are not the regions with less debt. For example, we can analyse that Valencian Community is the region with the highest level of public debt related to its percentage of GDP. Its debt is of 42.5%, followed by Castile-La Mancha (36.0%), Catalonia (34.8%) and Balearic Islands (29.4%). It exists a little paradox because some of these regions, that have movements to claim independence of Spain, are the regions more in debt with the whole country.

Table 20. Regional inequalities by economic indicators in terms of positive and negative aspects according to last year

Last data	Positive +	Negative -
Unemployment rate (2017)	Navarre (9.6) Basque Country (10.6) Aragon (11.4)	Ceuta (26.0) Extremadura (25.1) Melilla (24.6)
GDP (2017)	Catalonia (223,139 M.€) Madrid (219,976 M.€) Andalusia (155,213 M.€)	Melilla (1,523 M.€) Ceuta (1,660 M.€) La Rioja (8,137 M.€)
Debt (% GDP, 2017)	La Rioja (14.1%) Madrid (14.9%) Canary Islands (15.9%)	Valencian Com. (42.5%) Castile-La Mancha (36.0%) Catalonia (34.8%)

Source: S.N.I.S. and DatosMacro, own elaboration.

4. ECONOMETRIC MODEL

The hypothesis definition of this model assumes that an increase of births could be explained by an increase of marriage, foreigners and life expectancy. The mathematical expression for the model is shown in the following table:

Table 21. Regression model elaborated for birth hypothesis

Model	Hypothesis definition	Research hypothesis	Empirical evidence
Δ **Births** $= \beta_1 + \beta_2 \, \Delta$ **Marriage** $+ \beta_3 \, \Delta$ **Foreigners** $+ \beta_4 \, \Delta$ **Life Expectancy** $+ \varepsilon$	An increase of births could be explained by an increase of marriage, foreigners and life expectancy.	$\beta_2 > 0$ $\beta_3 > 0$ $\beta_4 > 0$	Accepted Sig. 1% Accepted Sig. 1% There isn't EE.

Source: own elaboration.

The relation between migrations-fertility questions if migrations have a reducer or a stimulator impact, which is testing the socialization hypothesis. Some authors suggest that the first generation of immigrants use to keep the reproductive patterns of their country of origin (Abbasi-Shavazi&McDonald 2002 in Castro Martin&Rosero-Bixby, 2011). So, fertility behaviour would trend to increase because of the age of migrations.

The results of the regression model operated with STATA software can be seen in the table 5. We analyse that the correlations between marriage-births and foreigners-births are good with a significance of 1%, the less percentage of

error. In Split of there isn't exist any correlation between life expectancy-births in Spain, the hypothesis can explain the model in the 63.77% of cases.

Table 22. Results of birth regression model for national level in Spain.

Dependent variables	Model
Δ Marriage	1,361033*** (0,3498202)
Δ Foreigners	0,382156*** (0,0070639)
Δ Life Expectancy	6541,039 (9965,814)
Constant	-5236,779 (3402,889)
R Square Aj	0,6377
F	11,56
pvalor	0,0003***
N	19

*** Sig = 1%. Standard errors between parenthesis.
Source: STATA, own elaboration.

5. CONCLUSIONS

Regional inequalities exist (except for middle ages of maternity) and we can show it through the following points:

- For Natural Balance, we conclude that the northern regions are the more aging regions in contrast to Ceuta and Melilla (Autonomous Cities in Africa). For example, the natural balance in 2017 was between 10 in Melilla to -5 in Galicia.

- Foreigners were concentrated on the Mediterranean coast and on the Autonomous Cities in Africa (in specific Melilla) during the last years.

- The regions which have a higher fertility rate have a lower middle age of maternity are Melilla, Ceuta and Murcia. For middle ages of maternity, there is not exist many differences between regions and the highest is for Basque Country (32.9) in 2017.

- The inequalities in Spain are so pronounced between North-South in terms on unemployment rates. Also, the differences by productive sectors are huge between North-South. The percentage of GDP at industrial sector is focus on the northern regions and the service sector is the highest, specially for touristic areas as the Mediterranean coast, Balearic or Canary Islands

- Spanish regions with more GDP are not the regions with less public debt, except Madrid.

- The regression model explains with 63.77% the hypothesis definition about an increase of births could be explained by an increase of marriage, foreigners and life expectancy in Spain. The only correlation rejected was between life expectancy and births.

REFERENCES

Abbasi-Shavazi, M.J. & McDonald, P. (2002) "A comparison of fertility patterns of European immigrants in Australia with those in the countries of origin." in Castro Martín, T. & Rosero-Bixby, L. (2011) Maternidades y fronteras: la fecundidad de las mujeres inmigrantes en España. *Revista Internacional de Sociología*, Vol. 69, nº 1, pp. 105-138.

Carter Hill, R., Griffiths, W. E. & Lim, G. C. (2012). Principles of Econometrics (4th ed.). Asia: John Wiley & Sons.

Engle, R.F. (1982) Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of UK Inflation. *Econometrica,* Vol. 50, pp. 987-1008.

Goldstein, J. R., Sobotka, T., & Jasilioniene, A. (2009). The End of "Lowest-Low" Fertility? *Population & Development Review*, Vol. 35, nº4, pp. 663–699.

Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics*, Vol. 2, nº 2, pp. 111–120.

Yule, G. U. (1926). Why do we Sometimes get Nonsense-Correlations between Time-Series?--A Study in Sampling and the Nature of Time-Series. *Journal of the Royal Statistical Society*, Vol. 89, nº 1, pp. 1-63.