



Does Higher Education Impact the Regional Unemployment Rate in Spain from 2001 to 2011?

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Introduction

The health of an economy depends on the quantity and quality of a state's human capital that comprises the labor force. To increase the quantity and quality of a labor force, individuals need access to the tools to succeed and contribute to the productivity of the economy. Thus, education is an essential determinant of the well-being of an economy.

Cháfer (2015) notes that Spain's democratic transition from a dictatorship to a modern democracy explains Spain's present economic condition. In 1986 Spain entered the European Union. This marked the beginning of one of two low unemployment trends in Spain's recent history. Cháfer (2015) notes that the periods from 1986-1991 and 1995-2007 were expansion periods, during which unemployment rates were low. After the global financial crisis began in 2008, however, Spain experienced a gradual, 12 percentage point increase in its national unemployment rate from 2009 to 2011. By 2013, Spain's unemployment rate rose to more than 26% (US CIA). In 2013 the Spanish government began implementing labor reforms that, as of 2015, reduced the unemployment to a still very high 22%.

This paper uses a panel regression to estimate the effects of gender, region and education levels on regional unemployment rates. Education level is measured using primary education, secondary education and tertiary education for both males and females.

Methodology & Data

- Six Independent Variables: Education levels
 - UNESCO (2012) International Standard Classification of Education (ISCED) 2011 report
 - classifications of educational attainment range from early childhood education to doctoral degrees (1-8)
 - I analyzed level 1, 3 and 6: primary education, upper secondary education and a Bachelor's degree
 - Educational attainment of an individual
 - Interaction term between gender & education level
 - Variables are measured in thousands of persons, measured each year from 2001-2011
- Dependent Variable: Regional Unemployment Rate
 - Eurostat from 2001 to 2011
 - Men and Women above the age of 15
 - Classified by the nomenclature of territorial units for statistics' (NUTS) level 2 subdivision of economic territories in the European Union
- Regions Analyzed
 - Ceuta and Melilla have considerable sample errors and are omitted
 - 17 regions studied: divided into North and South

Table 1

Summary Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum
Unemployment Rate (regional total)	11.8	5.58	4.1	30.10
Male Primary	79.21	76.13	7.54	292.15
Male Secondary	31.81	27.64	3.34	124.42
Male Tertiary	1.99	2.49	0.11	13.00
Female Primary	76.90	76.19	7.20	317.87
Female Secondary	34.48	29.61	3.79	123.51
Female Tertiary	2.04	2.47	0.13	11.31

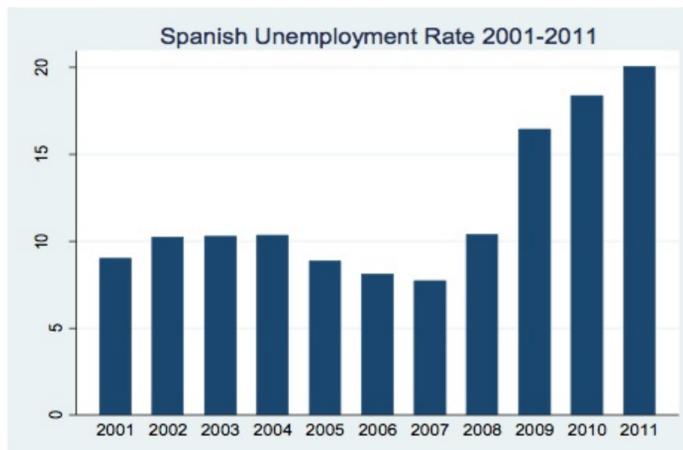


Figure 1

Figure 1

- 2001-2004: steady
- 2005-2007: begins to decrease
- 2008: rapid increase
- 2009-2011: unemployment steadily increasing
- The 2008 global financial crisis appears to affect unemployment rates

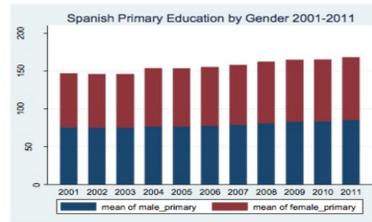


Figure 2

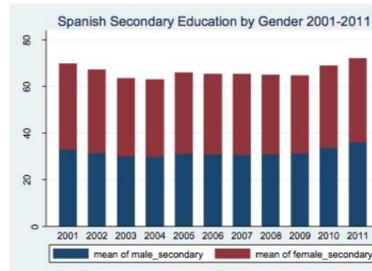


Figure 3

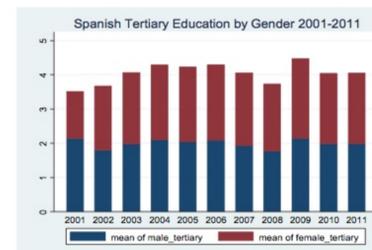
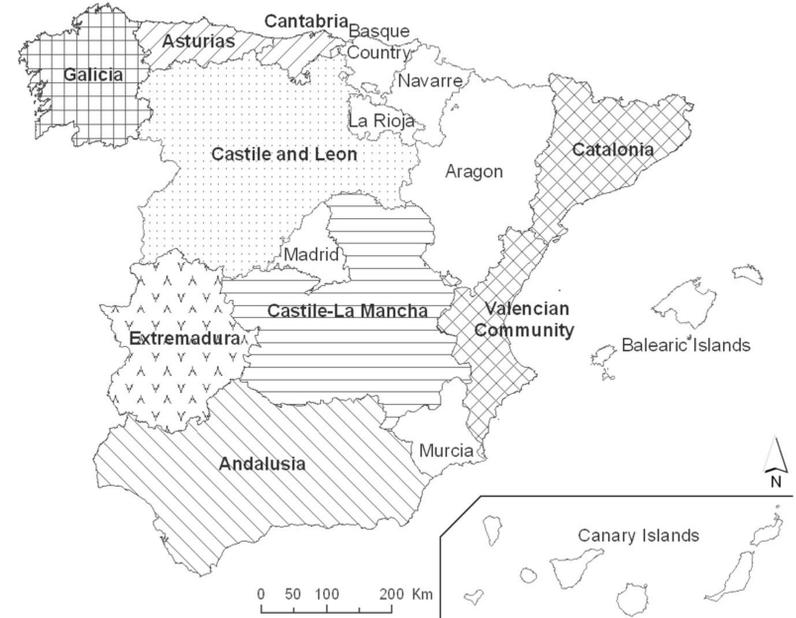


Figure 4

Figures 2-4

- Average number of people who achieve different levels of education in Spain each year
- No sudden change in educational attainment after 2008
- Illustrates the number of women achieving different levels of education is higher than that of men
- Figures 2 and 3 have relatively steady enrollment numbers
- Figure 4 shows both the average of men and women enrolled in tertiary education varies from year to year
- Does not appear that the 2008 global crisis changed the number of individuals obtaining an education



Regional Differences

Hypothesis (1)

There is a lower unemployment rate across northern regions compared to southern regions.

- Model 1
- $H_0: \beta_7=0, H_a: \beta_7>0$
- $t_{\beta_7} = -3.12$
- Northern regions have a negative effect on the regional unemployment rate of Spain

Gender & Education

Hypothesis (2)

With respect to tertiary education, females have a stronger relationship with the unemployment rate compared to males.

- $H_0: \beta_6=\beta_3, H_a: \beta_6>\beta_3$
- Model 1: $t_{\beta_6}=1.1, t_{\beta_3}=0.52$
- Model 2: $t_{\beta_6}=1.7, t_{\beta_3}=1.9$
- Females with a tertiary education have a stronger effect on the regional unemployment rate than males
- Both men and women with bachelor's degrees have a positive impact on the regional unemployment rate
- Reveals a growing labor force

Models

Model (1)

$$u_{it} = \alpha_0 + \beta_1 x_{maleprimaryt} + \beta_2 x_{femaleprimaryt} + \beta_3 x_{malesecondaryt} + \beta_4 x_{femalesecondaryt} + \beta_5 x_{maletertiaryt} + \beta_6 x_{femaletertiaryt} + \beta_7 D_{region} + \epsilon_{it}$$

Model (2)

$$u_{it} = \alpha_1 + \beta_1 x_{maleprimaryt} + \beta_2 x_{femaleprimaryt} + \beta_3 x_{malesecondaryt} + \beta_4 x_{femalesecondaryt} + \beta_5 x_{maletertiaryt} + \beta_6 x_{femaletertiaryt} + \beta_7 D_{region} + \beta_8 D_{2008} + \epsilon_{it}$$

Table 2 Panel Regression Results: Regional Unemployment Rate

Regressor	Model 1 (Robust SE)	Model 2 (Robust SE)
Primary*Male	-0.06 (0.05)	-0.07 (0.08)
Secondary*Male	0.36*** (0.12)	0.78*** (0.15)
Tertiary*Male	0.14 (0.27)	0.65* (0.35)
Primary*Female	0.002 (0.03)	0.01 (0.05)
Secondary*Female	0.07 (0.11)	-0.26* (0.14)
Tertiary*Female	0.19 (0.18)	0.40* (0.23)
D_{region}	-2.81*** (0.90)	-1.89 (1.32)
D_{2008}		5.95*** (0.64)
Intercept	3.31	-2.49
Summary Statistics		
SER	1.77	2.69
R^2	0.92	0.80
Total Observations	187	187

Implications of the 2008 Financial Crisis

Hypothesis (3)

The 2008 financial crisis has significant effects on Spain's regional unemployment rates.

- Model 2 adds the dummy variable D_{2008}
- $H_0: \beta_8=0, H_a: \beta_8 \neq 0$
- $t_{\beta_8}=9.3$
- The 2008 global crisis does effect regional unemployment rates in Spain

References

- Cháfer, C. M., 2015, An Analysis of the Okun's Law for the Spanish Provinces, Research Institute of Applied Economics and Regional Quantitative Analysis Research Group, Working Paper 37, Universitat de Barcelona.
- Education, International Standard Classification of. "International Standard Classification of Education ISCED 2011." ISCED 2011 (2012): 1-84. UNESCO. UNESCO Institute of Statistics, Dec. 2012. Web. 1 Dec. 2016.
- Ewing, B. T., Levernier, W., and Malik, F., 2005, Modeling Unemployment Rates by Race and Gender: A Nonlinear Time Series Approach, Eastern Economic Journal, Palgrave MacMillian Journals, 31(3), 333-347.
- Murphy, K.J., Hofler, R.A., 1984, Determinants of Geographic Unemployment Rates: A Selectively Pooled-Simultaneous Model, The Review of Economics and Statistics, 66(2), 216 - 223.
- United States. Central Intelligence Agency. The World Factbook - Spain. Central Intelligence Agency, n.d. Web. 25 Oct. 2016.