Regional Income Differences in Borderlands: A Convergence Analysis

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Abstract - **We intend to answer questions like if geography influences the pattern of inequality, that is, if the standard of living varies from region to region, with special attention to the borders, and if it reveals the presence of spatial correlation. The aim of the paper is to study the regional income differences among the NUTs 3 regions of Portugal and Spain in the borderland of these two countries. After a brief introduction we evaluate the inequalities among borderland regions using information about per capita wages. Considering the neighbourhood relationships between the NUTs 3 regions located in the Portugal-Spain border it is possible to conclude that wages are spatially autocorrelated.**

Keywords - *Borders; borderlands; income distribution; spatial correlation; Spain; Portugal.*

1.   Introduction

Regional imbalances represent an intrinsic characteristic of the European economy. In fact, as stated in Mateus et al. (2000), the structural evolution of the European economy has shown a real convergence between countries and divergence between regions, so the economic and social cohesion, namely the approach of the various territories in terms of standard of living is assumed to a primary objective of economic policy. As such, concerns about inequality in income distribution have gained importance, encouraging the various studies that address specially inequality among individuals within each country [see the studies of Rodrigues (1994, 1999, 2008) for Portugal and, for instance, García & Molina (2001), Goerlich & Mas (2001) for Spain].

The aim of this paper is to study the regional income differences among the NUTs 3 regions of Portugal and Spain in the borderland of these two countries. Following Guerreiro (2012), our research aims to address the problem of inequality in income distribution from a different perspective and we want to answer the following questions:

- Does geography influence the pattern of inequality, especially in borderland?

- Can we observe spatial correlation in regional per capita wages, especially in the borderland?

To meet the objectives set out, we evaluate the inequalities and spatial correlation among borderland regions using information about per capita wages.

After this introduction, in section 2 we present the methodological framework and the results about regional income differences in the Portugal-Spain border. Finally, we conclude with a synthesis of results and possible future developments in the context of this work.

2.   Regional income differences in the Portugal-Spain border

2.1 Methodology

Given the importance that spatial phenomena such as spillover effects, location and distance assume in regional science, it is clear that spatial dependence is a phenomenon that plays an important role in this science. Consequently, if the values observed by some variable do reflect some spatial dimension, as the result of some of those phenomena, which may be theoretically explained or simply data driven, the use of statistical techniques that take that dimension into consideration is obviously desirable (see Anselin 1988 as (one of) the first comprehensive textbooks on these matters and/or Arbia 2006 for a recent textbook contribution).

The application of spatial statistics techniques can thus be justifiable when it exists a theoretical model supporting the existence of spatial dependence, and/or the data shows evidence of spatial autocorrelation after being detected by suitable tests.

As such, the detection of spatial dependence is of obvious importance in these matters. The use of a neighbouring matrix makes it possible the computation of a statistic for the Moran's I test, which is, roughly speaking, the correlation coefficient between the values of the variables by each spatial unit and the mean values of that variable in neighbouring spatial units.

That computation, in turn, requires the determination a neighbouring matrix, which can be related with distance or just contiguity relationships. In this last case, two kinds of contiguity can be considered: (a) a 'rook' kind, which considers a spatial unit j to be a neighbour of spatial unit i when it shares a common border and (b) a 'queen' kind, which considers a spatial unit j to be a neighbour of spatial unit i when there is a, at least one, point that is common in the borders of both spatial unit. In each of the two cases, one may construct a neighbourhood matrix W= [wij], where wij = 0 if spatial unit j is not a neighbour of spatial unit i (and if i = j) and wij = 1 if spatial unit j is a neighbour of spatial unit i.

As a matter of fact, the comparison of the values registered by the variable of interest, at location i, and the average of the values registered by its neighbours allows to conclude about the relative (to its neighbours) performance of each spatial unit, taking into account that spillover effects may exist and significantly contribute to that performance (Caleiro, 2007) . In the next section this methodology will be applied to the 2008 per-capita wages registered by the NUTs 3 located on the Portugal-Spain border.

2.2 Results

In the Portugal-Spain border there are 10 Portuguese NUTs 3 and 7 Spanish NUTs 3. Table 1 shows the list of these and the values of the 2008 per-capita wages.

Table 1- Per capita wages (2008) in the NUTs 3

Nuts 3	Per-capita wages (euros)
Minho-Lima	15852.18
Cávado	15866.00
Alto Trás-os-Montes	18090.04
Douro	16870.45
Beira Interior Norte	17430.45
Beira Interior Sul	18049.92
Alto Alentejo	18132.36
Alentejo Central	17935.46
Baixo Alentejo	18692.29

Algarve	17593.60
Pontevedra	27361.83
Orense	25406.25
Zamora	27099.62
Salamanca	27708.99
Cáceres	26408.33
Badajoz	25502.68
Huelva	26471.21

Table 1 shows the apparent difference on the standard of living between Portugal and Spain. Moreover, the disparity of wages is higher in Portuguese side of the border (standard-deviation of 967.99) than in the Spanish counterpart (standard deviation of 888.26). This fact indicates the existence of higher inequality in wage distribution in Portugal than in Spain.

Given our objectives, it is important to take into account also the NUTs 3 that, despite not being located in the border, are in the neighbourhood of those under scrutiny (see Figure 1). In what concerns Portugal, those include Ave, Grande Porto, Tâmega, Dão-Lafões, Cova da Beira, Serra da Estrela, Pinhal Interior Sul, Lezíria do Tejo, Médio Tejo, Alentejo Litoral and Península de Setúbal. Concerning Spain, those include La Coruña, Lugo, Léon, Valladolid, Ávila, Toledo, Ciudad Real, Sevilla, Córdoba and Cádiz.
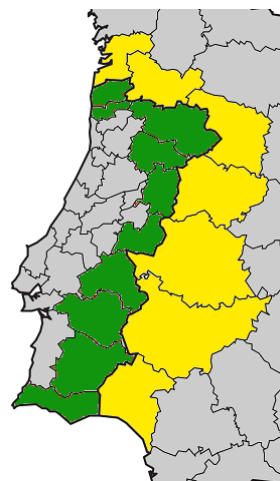

Figure 1 – The NUTs 3

Considering now the neighbourhood relationships between the NUTs 3 located in the Portugal-Spain border it is possible to conclude that wages are spatially autocorrelated (correlation coefficient of 82,01% with all the neighbours) but that is due essentially to the domestic neighbours (correlation coefficient of 96,91% with all the domestic neighbours) and not at all with the

neighbours of the other country (correlation coefficient of -96,87% with all the foreign neighbours), such that a clear border effect – in the restricting way – do exist (correlation coefficient of -10,05% with all the neighbours in the border).

3.   Conclusion

This paper is about regional income differences in borderlands. It considers the particular case of wages per capita on the NUTs 3 located in the Portugal-Spain border. Using a spatial econometrics approach, i.e. taking into account the neighbourhood relationships, it is concluded that wages are spatially autocorrelated, which, indeed, justifies that approach. Moreover, it is concluded that there is a clear border effect, as a barrier to wealth spreading.

Plainly, it is possible to better study the convergence patterns among the regions (under study) by considering an extended time horizon. This would make it possible to estimate spatial econometric models to test convergence. Moreover, there are apparent potentialities of spatial clusters as a complementary analysis in the study of regional income differences, whether in borderlands or not.

The current paper is to be continued through the use of complementary methodology and more extensive comparisons.

Acknowledgments

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