

## 4. Ensaios: Does distance matter for determining regional income in the European Union? An approach through the market potential concept\*

Por Jesús López-Rodríguez<sup>2</sup> e J. Andrés Faíña<sup>3</sup>

### 4.1 Introduction

The idea that market access is important for determining regional income dates back at least to Harris (1954) who approximates a market potential function, which expresses the potential demand for goods produced in a location as the sum of the purchasing power in all other locations, weighted by transport costs. The market-potential function has a long history in urban economics, Clark et al.(1969); Dicken and Lloyd (1977); Keeble et al. (1982) focusing instead on the implication for the location of production. Our investigation focuses on the relationship between market potential and income for the European Union (EU) regions over the period 1982-1999. We proved that closeness to large consumer markets or in other words, market potential, was an important explanatory variable for regional income in the early eighties, but it has decreased its significance in determining EU regions income on the 1990's.

### 4.2 The formulation and significance of market potential

The concept of market potential obeys the following expression:

$$MP_i = \sum_{j \neq i}^n \frac{M_j}{D_{ij}} \quad (1)$$

where  $MP_i$  is the market potential of region  $i$ ,  $M_j$  is a measure of the volume of economic activity of region  $j$ ,  $D_{ij}$  is a measure of the distance or transport costs between  $i$  and  $j$  and  $n$  is the number of regions considered.

Market potential at a given location represents an index of the aggregate market demand from the whole structure of population weighing the number of inhabitants by their distance to this location.

In our paper we have constructed the market potential for the NUTS 2 regions of the fifteen EU countries for the years 1982, 1989, 1994, 1997 and 1999 using as a variable of economic activity ( $M_j$ ) the population of each region. Mathematically, the expression we use to compute the market potential values is the following one:

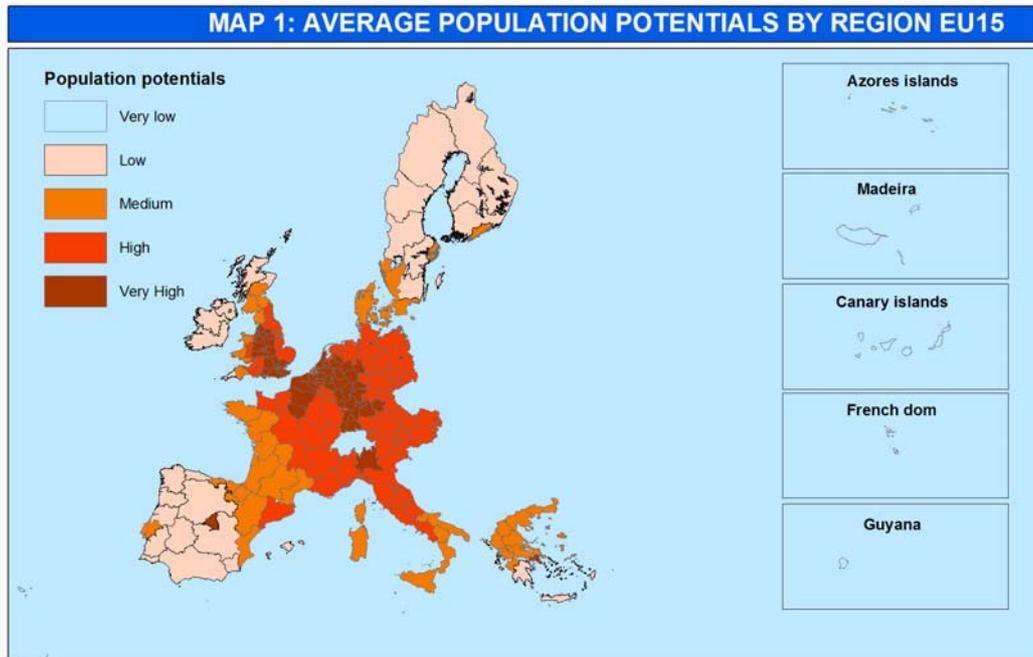
$$MP_i = P_{O_i} + \frac{P_{O_1}}{D_{i,1}} + \dots + \frac{P_{O_n}}{D_{i,n}} = P_{O_i} + \sum_{j \neq i, j=1}^n \frac{P_{O_j}}{D_{i,j}} \quad (2)$$

The results of our computations can be seen in the following map (map 1). Map 1 displays a classification in five levels of our market potential values within the EU15. It has been plot by using Arc Map 8.2 from ESRI.

\* As opiniões expressas no artigo são da responsabilidade dos autores não coincidindo necessariamente com as do Ministério da Economia e da Inovação.

<sup>2</sup>Corresponding author: J. López-Rodríguez ([jelopez@udc.es](mailto:jelopez@udc.es)), Department of Economic Analysis and Business Administration, Faculty of Economics, University of A Coruña, A Coruña, 15.071 Campus de Elviña s/n, Spain, Phone number:+34 981 167050 ext:2590 and 2451, Fax:+34 981 167070. This article is a summary of a larger version that came out as "Does distance matter for determining regional income in the European Union? an approach through the market potential concept", *Applied Economics Letters*, vol. 13,6 pp. 385-390, 2006.

<sup>3</sup> Universidad de A Coruña e Cátedra Jean Monnet de Economía Industrial Europea.



The market potential values are reflected in the relative shade of the colour used, that is, the darker the shade of the region, the higher its market potential and visa versa. The map reflects a concentric distribution of the market potential values, which has its centre in an area in which the values are the highest, an area that is commonly known as the Golden triangle (Greater Manchester-London-Paris and the Rhur Valley). This area is surrounded by successive envelopes of decreasing market potential values, which eventually reach the Atlantic periphery where the values are lowest.

#### 4.3 Some econometric results

The relationship between the market potential values and the per capita GDP in the EU15 NUTS2 regions for specific years namely, 1982, 1989, 1994, 1997 and 1999 respectively estimating the following model:

$$\text{LnGDPpc}_{i,t} = a + c\text{LnMP}_{i,t} + u_{i,t} \quad (3)$$

The dependent variable is the Log of per capita gross domestic product (*GDPpc*). Figures on per capita income are based on Eurostat data (ESA79) for the years 1982, 1989, 1994 and 1997 and Eurostat data (ESA95) for 1999. Per capita GDP values are in purchasing power parities at constant 1985 prices. The independent variable *MPi* stands for log of market potential and we use the values we computed in the previous section, *u* is a random disturbance and *c* is the elasticity of per capita GDP with respect to market potential.

Table 1 contains the cross-section estimations of the model (3) for the years 1982, 1989, 1994, 1997 and 1999 respectively. Running the regressions for these years will allow us to evaluate if the explanatory power of market potential is hold constant over the time or if it has experienced some noticeable changes as we move forward testing our model for the last year of our analysis (1999).

Table 1

Market Potential and Regional Income EU15 (1982-1999)					
Dependent Variable: Log (Per Capita GDP)					
Variable	Coefficients				
	(1982)	(1989)	(1994)	(1997)	(1999)
Constant	-0.13 (0.69)	1.94 (0.61)	3.36 (0.51)	3.50** (0.50)	5.12** (0.47)
Market Potential	0.70*** (0.05)	0.55** (0.04)	0.45** (0.03)	0.44** (0.03)	0.32* (0.03)
Estimation	OLS	OLS	OLS	OLS	OLS
F Value	179.10	142.28	132.90	133.82	130.59
R2	0.58	0.47	0.44	0.44	0.42
Number observations	160				

Notes: \*\*\* indicates coefficient is significant at 0.01 level, \*\* significant at 0.05 level \* significant 0.10 level  
t-statistics are based upon White's heterocedasticity-adjusted standard errors

From the output of the estimations, it can be seen that the coefficients are significant and the signs correspond with theoretical expectations. Moreover, the effects of market potential on regional per capita income are decreasing over time. Market potential explains 58% of the cross-region variation in per capita GDP in 1982 and since then its explanatory power has continuously been decreasing, where in 1997 the R2 of the regression falls by around a quarter to 44% and by 1999 to 42%.

The interpretation of this result is very interesting taking into account that one spatial factor that determines regional income is the closeness to large consumer markets as it is emphasized in demand oriented models of regional growth (Kaldor 1970) and the agglomeration effects of the new economic geography models (NEG). This effect can be captured by our market potential values, so what our results prove is that closeness to large consumer markets or in other words, market potential, was an important explanatory variable for determining regional income in the early eighties and it has decreased its significance in determining regions income on the 1990's. Thus dynamic income regions have also emerged in the periphery, and need not necessarily be close to rich regions.

This fact calls us to think about the possible effects that the "new" European Union regional policy has exerted since the mid eighties. The regional policy of the European Union has an important effect in terms of boosting the growth of peripheral regions and therefore their income levels, so the results showed here could be a proof in that sense.

## References

- Clark, C.; Wilson, F.; Bradley, J. (1969) "Industrial Location and Economic Potential in Western Europe", *Regional Studies* 3, pp. 197-212.
- Dicken, P; Lloyd, P. (1977) "Location in Space", New York: Harper and Row
- Harris, C. (1954) "The market as a factor in the localization of industry in the United States", *Annals of the Association of American Geographers* 64 (1954), pp. 315-348.
- Keeble, D.; Owens, P.L.; Thompson, C. (1982) "Regional Accessibility and Economic Potential in the European Community", *Regional Studies* 16. pp. 419-432.
- Lösch, A. (1954) "The Economics of Location", B. Aires: El Ateneo (1957), pp.105-108.