ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Measuring Geographic Indicators in OECD Regions

ESPON 2013 Programme
12th November 2008
Luxembourg

Outline of Presentation

1. Distance and Accessibility
   - Internal Demand OECD and TDPC Committee
2. Measuring Market Distance and Accessibility
   - Methodology
   - Challenges encountered
3. Results
   - Maps
   - Quantitative results
4. Conclusions and Proposal for Future Work

Distance and Accessibility

Current OECD publication: "*The Contribution of Economic Geography to GDP per Capita*" at the macro level

- Why is geography important
- Analytical results
- Conclusions

At regional level there is a demand from TDCP

- Accessibility and inter-regional linkages
- Regional competitiveness with accessibility and market access

Methodology

Following ESPON study on peripherality of European regions

General formula in analogy with the gravitational theory:

$$A_i = \Sigma_j \, g(W_j) \, f(c_{ij})$$

- g(.) is a function of the centripetal force (*e.g.* population or GDP)
- f(.) a function of distance (centrifugal force)

Where:

- *i* is an index for a region
- the sum is over all other regions
- expressed as percentage of regions' average

Methodology

$A_i = \Sigma_j \, g(W_j) \, f(c_{ij})$

- Two forms for f(.) used:

  1. f(.) = simple linear distance between region centroids ("distance to markets");

  2. f(.) = $\exp(-\beta * d_{ij})$, for d = simple linear distance between region centroids ("access to (near) markets")

Two main drawbacks:

(a) does not account for travel time and transportation networks and modes;

(b) it is heavily affected by the size of the regions (a problem that is shared, at least partly, with indicators based on travel distance,)

Challenges

Measuring markets in the OECD:

A region's distance to markets defined by:

a) Average distance to all regions within the OECD

b) Average distance to OECD regions in blocks:

- Europe
- North America
- Asia

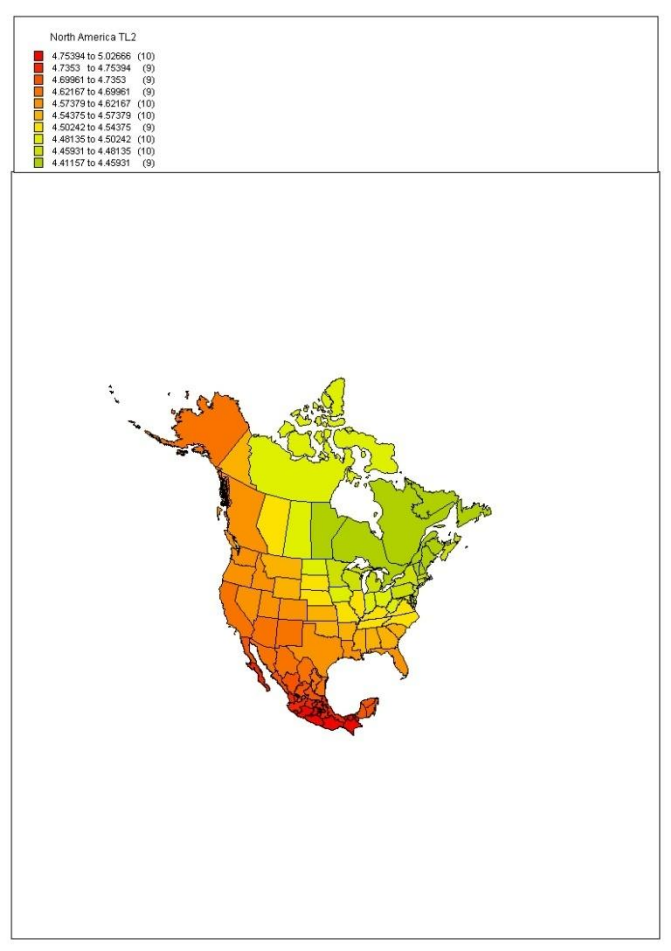
A region's accessibility is:

a) Average distance to all OECD regions

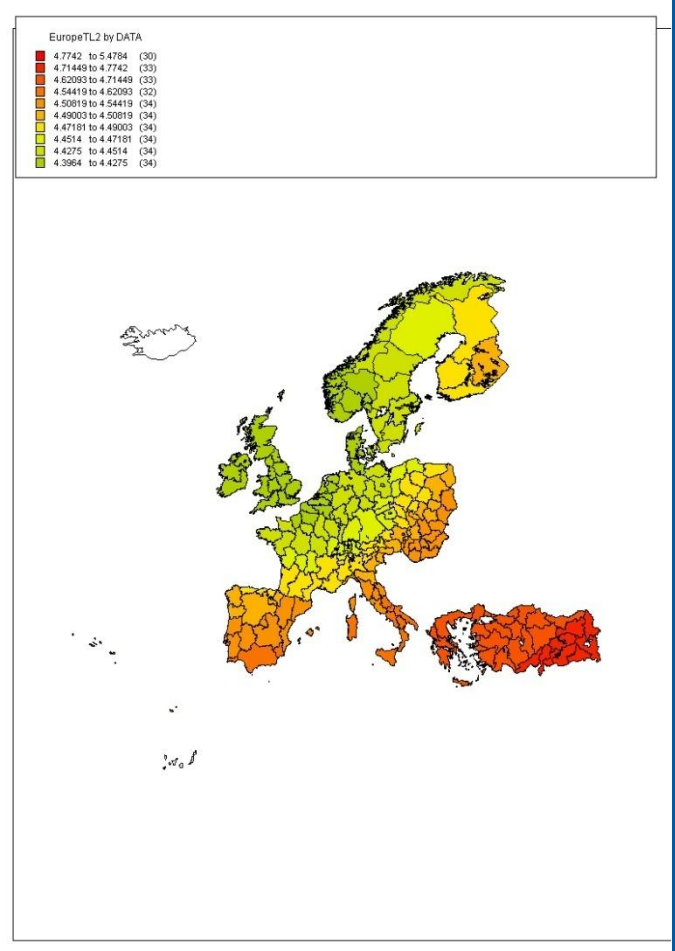
b) Average distance to OECD regions in blocks:

a) Giving more weight to neighbouring regions (contiguity)

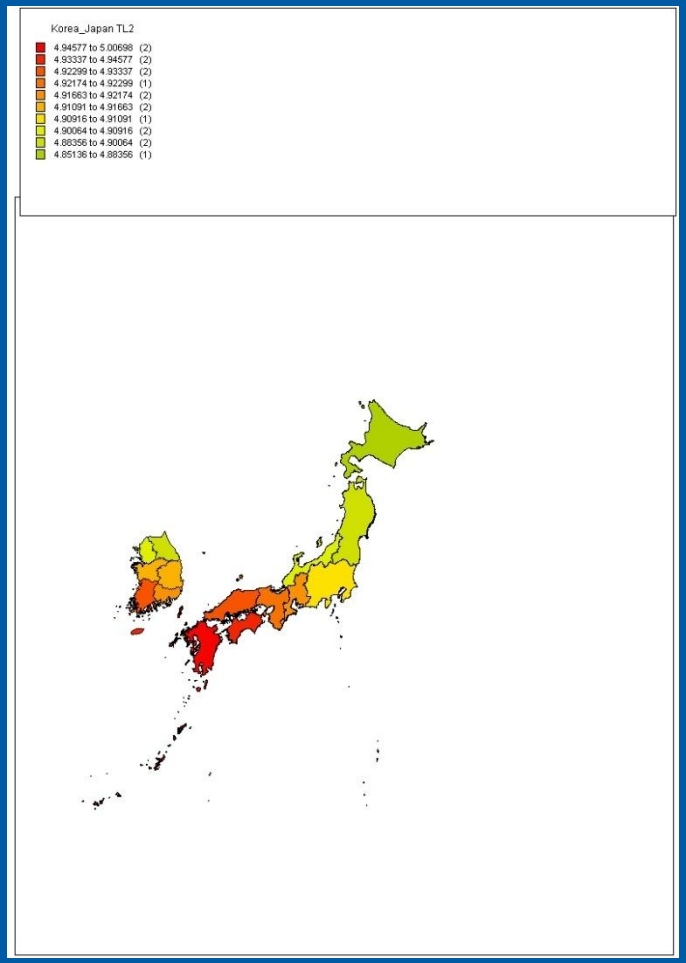
Distance to markets – total



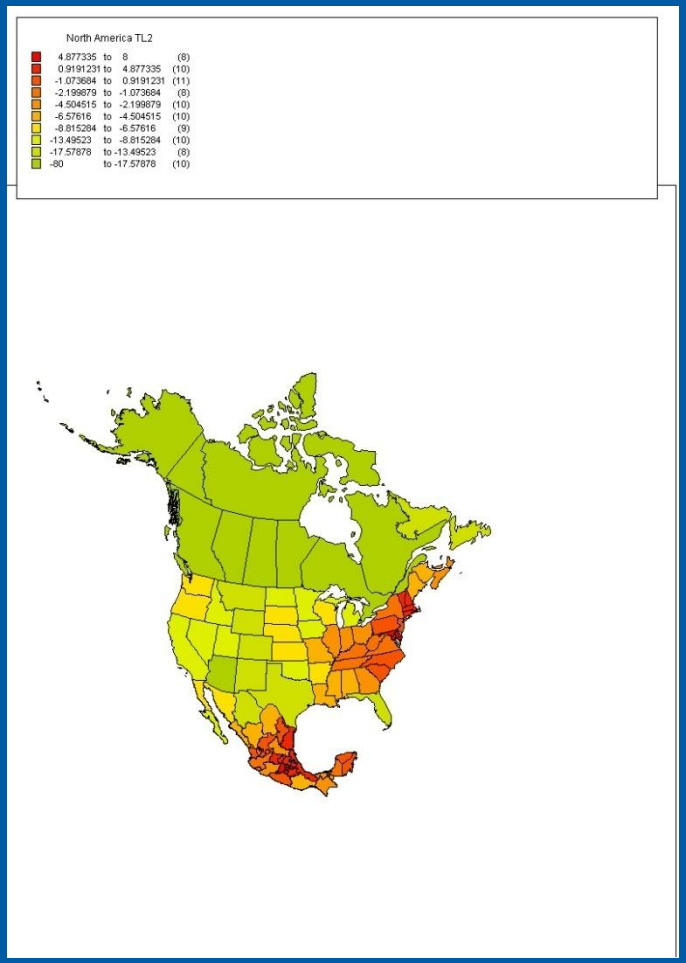
Distance to markets – total



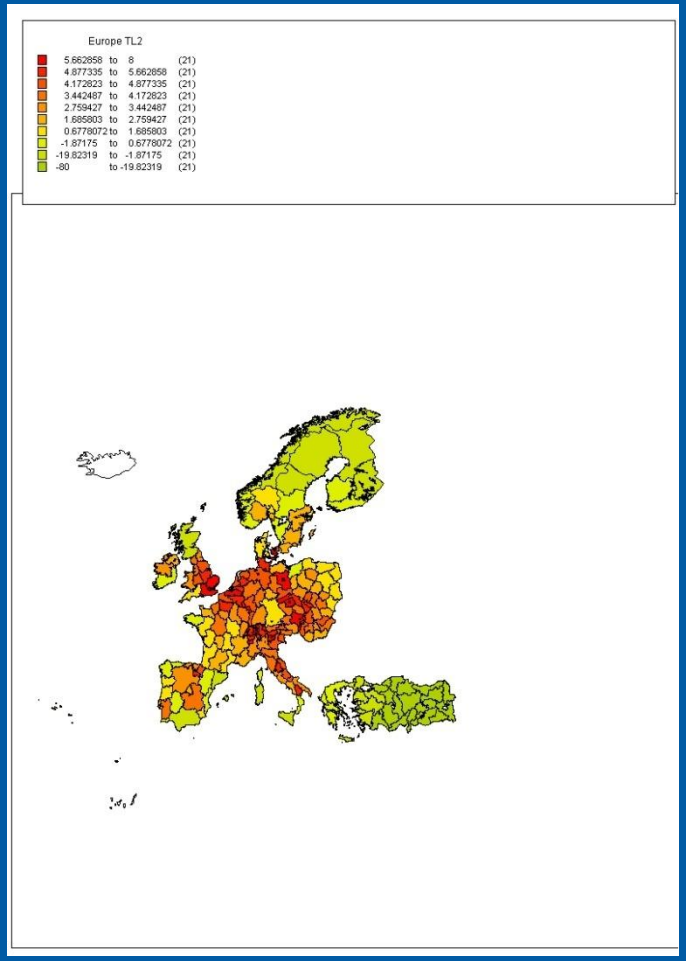
Distance to markets – total



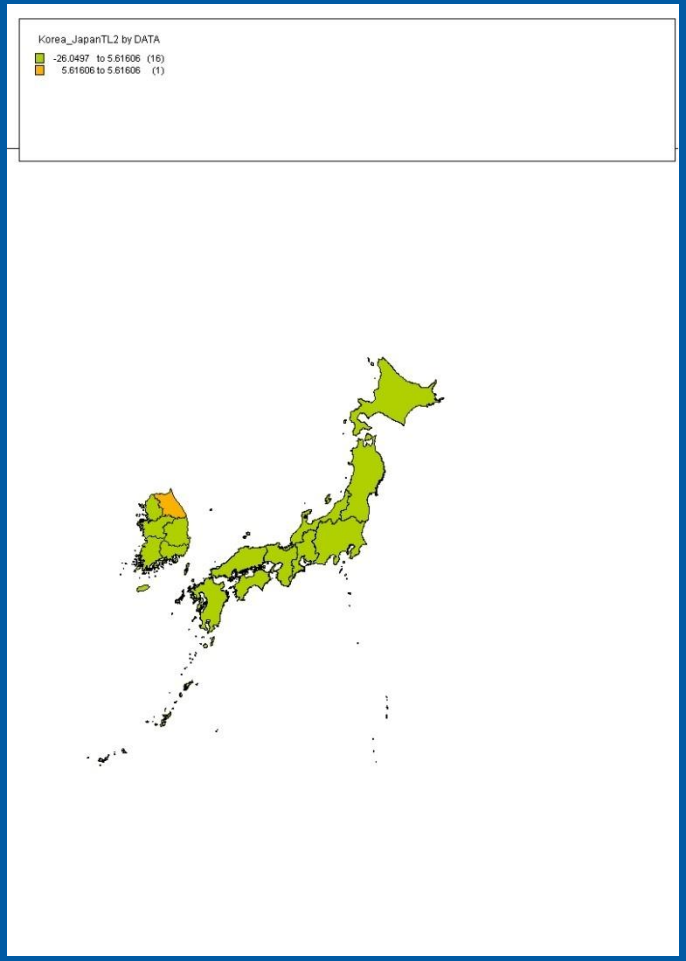
Accessibility – total



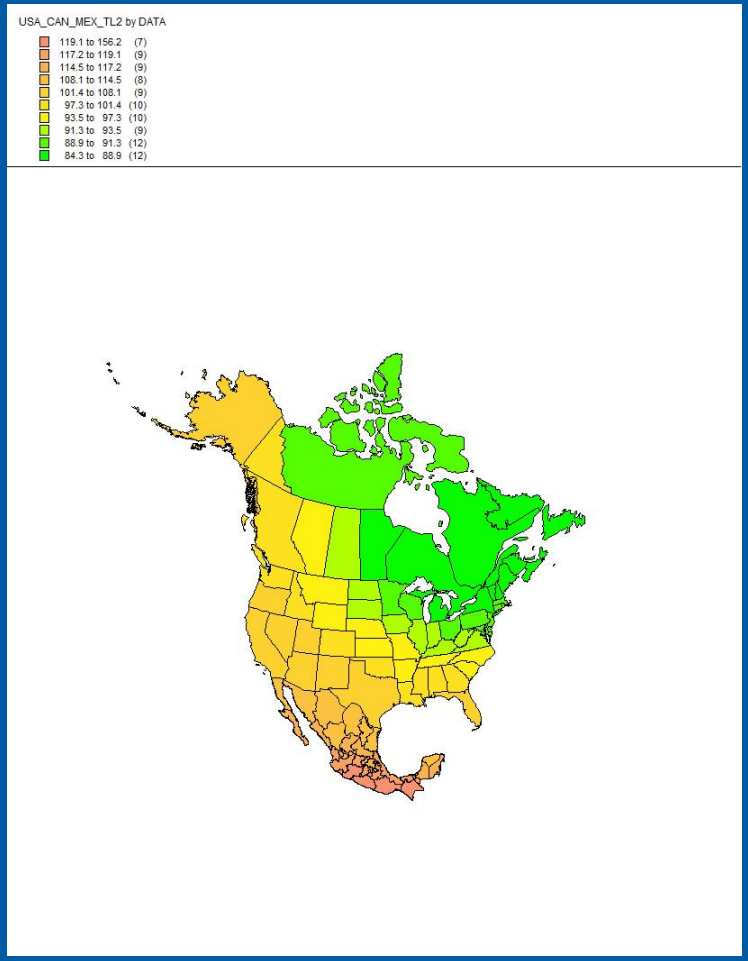
Accessibility – total



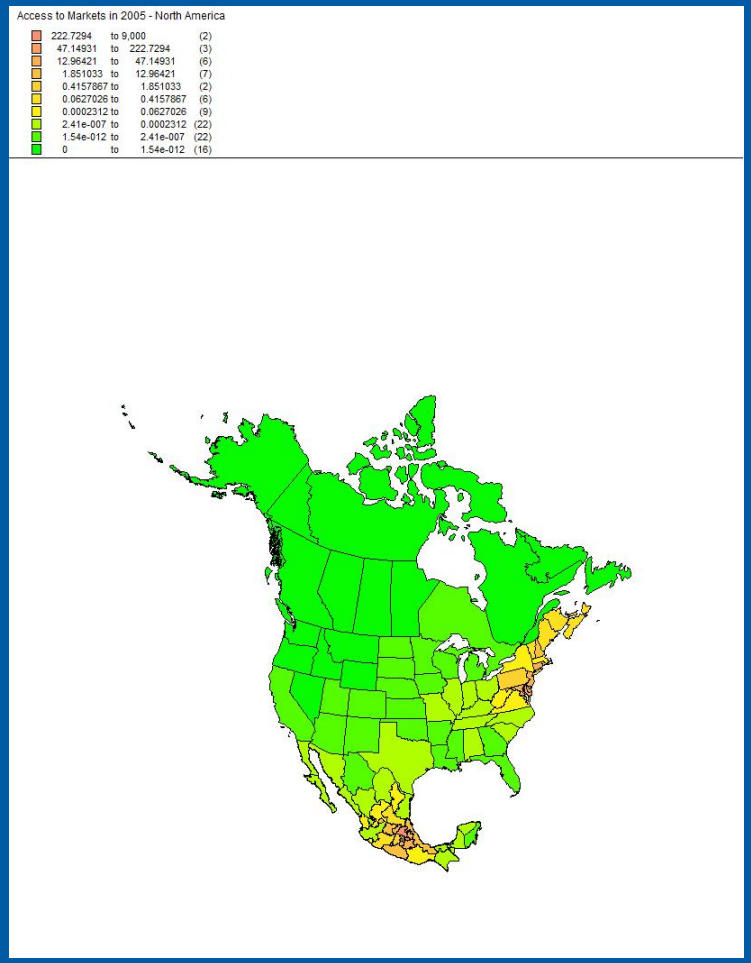
Accessibility – total



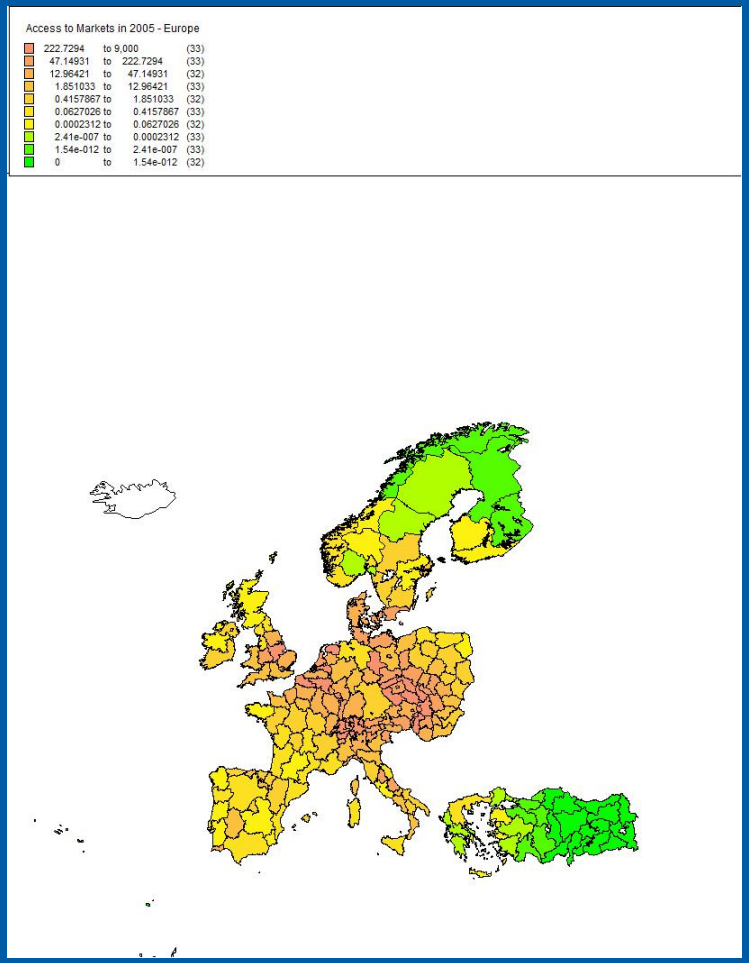
Distance to markets -- Blocks



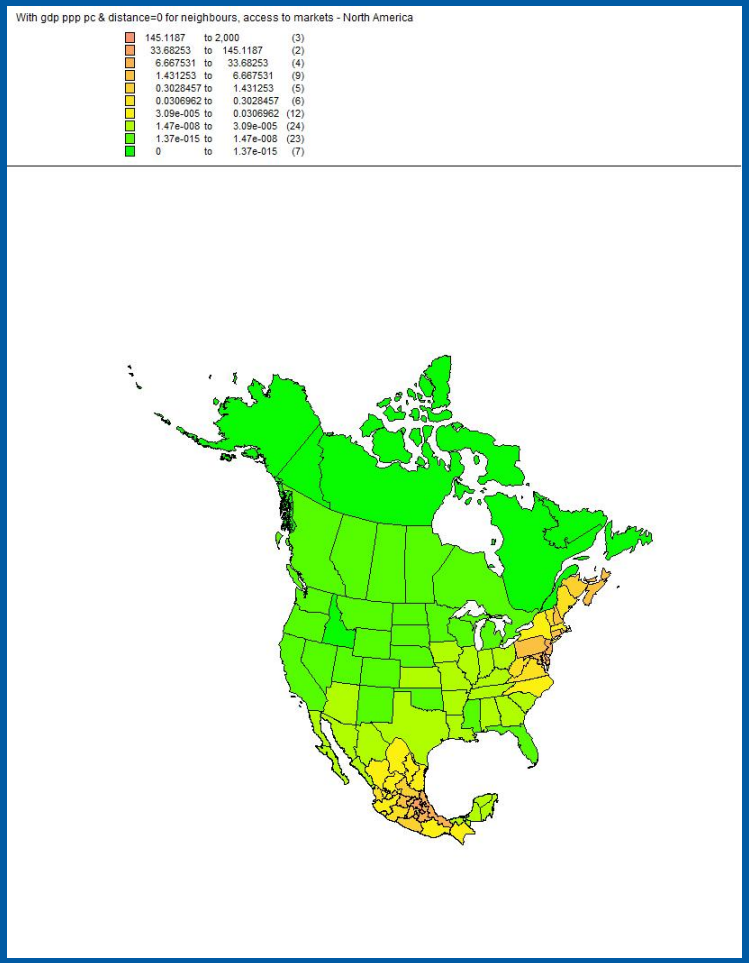
Access to Markets – Blocks



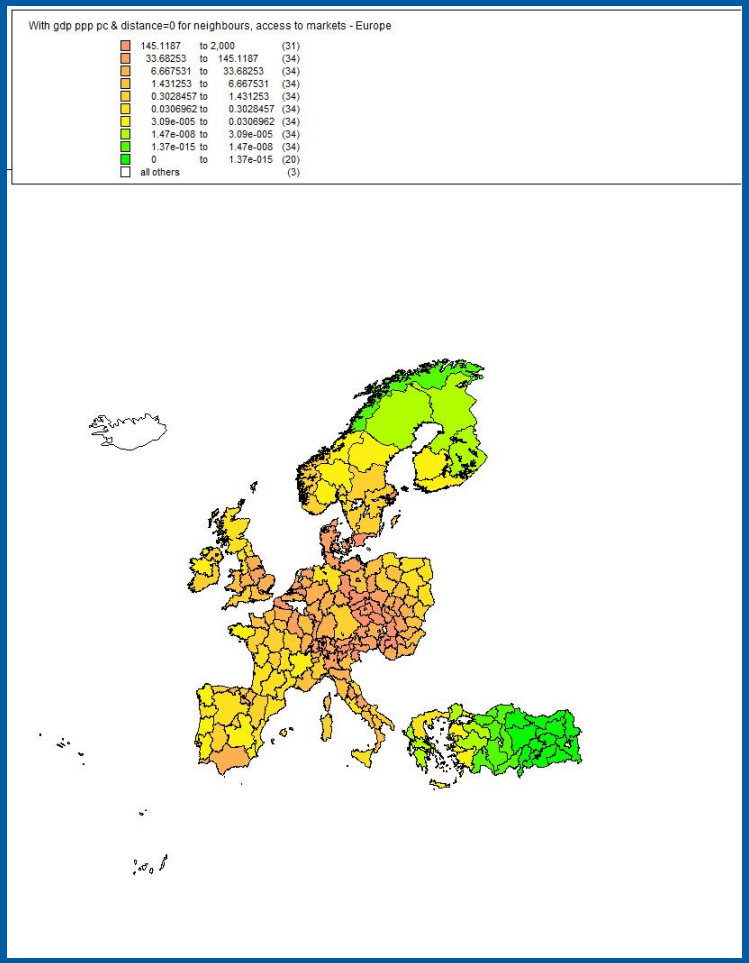
Access to Markets – Blocks



Access to Markets – Blocks & weighted



Access to Markets – Blocks & weighted



Results – Cross Sectional model

- Links between geographic measures and growth:
  - By blocks
  - Contiguity

$$\frac{1}{T}\ln\left(\frac{GPD_{t+T}}{GDP}\right)=\alpha+\beta_1\ln(GDP_t)+\beta_2\ln(Inf_t)+\beta_3(\Pr\_Ed\_att_t)+\beta_4\ln(Ti\_Ed\_att_t)+$$
$$+\beta_5 ER_t+\beta_6\ln(Pat_t)+\beta_7\ln(GDExp\_B_t)+\beta_8\ln(GDExp\_G_t)+\beta_9\ln(Spec\_Ag)$$
$$+\beta_{10}\ln(Spec\_Man)+\beta_{11}\ln(Market\_Dist)+\beta_{12}\ln(Accesibility)$$

	1	2	3	4	5	6	7	8	9	10	11
Constant	0.0268 (2.65)**	0.0013 (0.11)	0.1695 (11.54)**	0.1553 (9.06)**	0.1582 (9.33)**	0.1934 (6.44)**	0.193 (5.08)**	0.3014 (6.27)**	0.2972 (9.62)**	0.104 (1.46)	-0.0126 (-0.32)
Initial Y	-0.0006 (-0.59)	0.0012 (0.95)	-0.0122 (-9.45)**	-0.0097 (-6.21)**	-0.0094 (-5.95)**	-0.015 (-5.39)**	-0.0152 (-4.14)**	-0.0261 (-6.18)**	-0.026 (-8.6)**	-0.0214 (-5.04)**	-0.0047 (-1.2)
Infrast	---	0.0075 (0.86)	---	0.0093 (1.36)	0.0132 (1.92)	0.0156 (1.99)*	0.02 (2.31)*	0.0155 (1.89)	0.0172 (2.21)*	0.0148 (1.89)	0.0284 (3.23)**
Prim Ed	---	---	-0.0096 (-9.72)**	-0.0126 (-11.03)**	-0.0129 (-11.46)**	-0.0035 (-3.55)**	-0.004 (-2.93)**	-0.0075 (-5.06)**	-0.0079 (-5.42)**	-0.0091 (-6.36)**	---
Tert Ed	---	---	0.0076 (8.79)**	0.0091 (9.31)**	0.0097 (9.81)**	---	---	0.0089 (6.42)**	0.0087 (6.83)**	0.0096 (7.13)**	0.0067 (4.58)**
Empl rate	---	---	---	---	-0.0205 (9.33)**	---	---	---	---	---	---
Patents	---	---	---	---	---	0.0015 (2.5)**	---	---	---	---	---
R&D total	---	---	---	---	---	---	0.0019 (1.71)	-0.0007 (-0.47)	---	-0.0009 (-0.6)	---
R&D busin	---	---	---	---	---	---	---	---	---	---	-0.0026 (-2.3)*
R&D gov	---	---	---	---	---	---	---	---	---	---	0.0028 (2.98)**
R&D HEI	---	---	---	---	---	---	---	---	---	---	-0.0078 (-5.81)**
Sp Agric	---	---	---	---	---	---	---	-0.0014 (-2.04)*	-0.0009 (-1.41)	-0.001 (-1.65)	---
Sp Man	---	---	---	---	---	---	---	-0.0047 (-2.89)**	-0.0052 (-3.62)**	-0.0028 (-1.77)	---
Sp Fin	---	---	---	---	---	---	---	0.0029 (2.02)*	0.0031 (2.32)*	0.0014 (0.96)	0.0015 (1.03)
Mkt Access	---	---	---	---	---	---	---	0.0002 (0.39)	0.0009 (1.75)	---	0.0013 (2.19)*
Dist Mkts	---	---	---	---	---	---	---	---	---	0.0333 (3.67)**	---
R^2	0.0011	0.0082	0.2916	0.3235	0.3451	0.1652	0.1515	0.4712	0.4728	0.5111	0.4014
Adj R^2	-0.002	0.0019	0.2989	0.3134	0.3329	0.1505	0.1338	0.442	0.4493	0.4841	0.3717
F	0.35	1.29	40.93**	32.16**	28.24**	11.23**	8.57**	16.14**	20.17**	18.94**	13.5**
N	333	315	292	274	274	232	197	173	189	173	170

Conclusion

- Geography matters for growth
  - Consistent with previous studies :

Agglomeration Economies and Regional Comparative Advantages: New Evidence from Regional Employment Clusters

- Accessibility affects growth:
  - Only when R&D is accounted
- Distance to markets affects growth (unexpected sign)
  - Problem of measurement
  - Development – far from steady state