



RURAL DEVELOPMENT POLICIES AT REGIONAL LEVEL IN THE ENLARGED EU. THE IMPACT ON FARM STRUCTURES

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Main aims of the work

- to identify the main rural systems;
- to detect the impact of farm structures of the rural development programs.

Preliminary considerations

- Development of competitive and efficient farm structures
—→ one of the central goals of the EU agricultural policies.
- Marked difference in farm structures between:
 - Northern countries —→ farms of medium-large size and young holders;
 - Southern countries —→ farms of small size and old holders.
- 12 New Member States (NMS) acceded to the EU on 2004 and 2007 and this enlargement requires careful consideration.

Analysis tools

The main rural systems are identified by using a two steps methodology:

1. Geographically Weighted Regression that is able to split values in:
 - Spatial stationary;
 - Spatial non stationary: the same stimulus provokes a different response in different parts of the study region.
2. Gaussian hierarchical clustering algorithms and the EM algorithm for parameterized Gaussian mixture models (MCLUST).

Main problems in the indicators

In the construction of the data-set and in the clustering some problems emerge:

- *Comparability of territorial units:*

The 81 RD programs are referred to areas with quite heterogeneous size:

- National and
- Regional programs.

- *Data availability:*

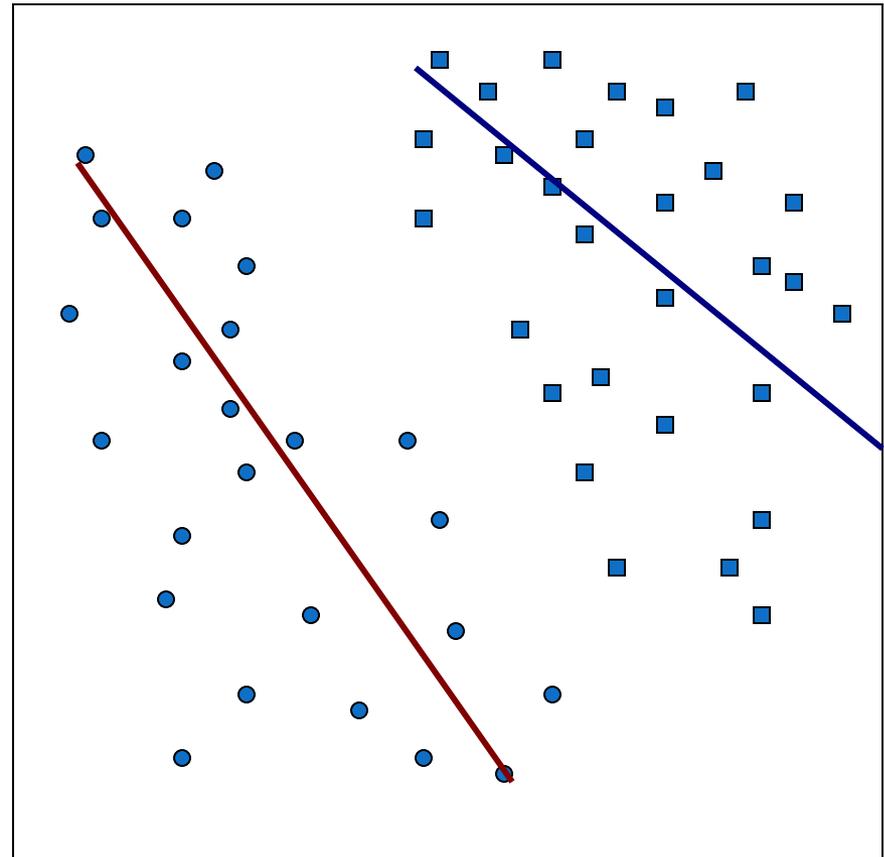
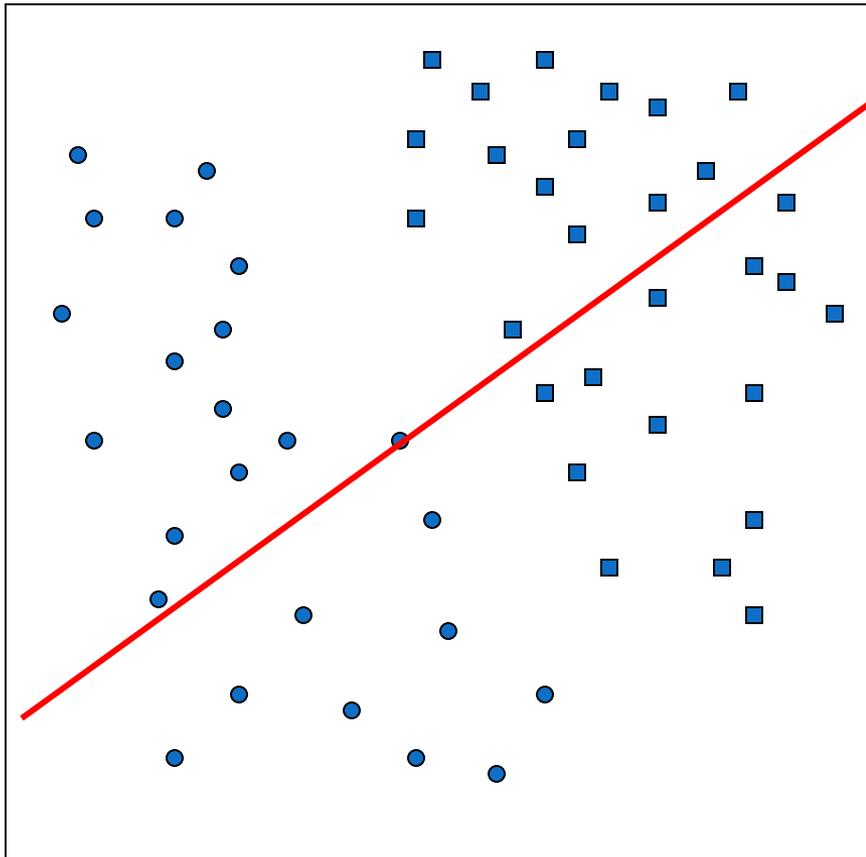
Only a limited number of indicators is easily available in the Eurostat-Regio database. Strong lack of environmental indicators .

Spatial stationarity vs. non stationarity

Simpson's paradox

Spatially aggregated data

Spatially disaggregated data



Gross value added in Agriculture

Gross value added in Agriculture

Spatial stationarity vs. non stationarity

- If non-stationarity is modeled by stationary models:
 - Possible wrong conclusions might be drawn;
 - Residuals of the model might be highly spatial autocorrelated.

Global vs. local models

- Ordinary regression model: $\longrightarrow y = \beta_0 + \sum_{k=1}^m \beta_k \mathbf{x}_k + \mathbf{u}$
 - The **same stimulus** provokes the **same response in all parts** of the study region,
 - Highly untenable for spatial process.

- GWR model: $\longrightarrow y_i = \beta_{0i} + \sum_{k=1}^m \beta_{ki} x_{ki} + u_i$
 - Local statistics are spatial disaggregations of global ones,
 - Local analysis intends to understand the spatial data in more detail.

$$\hat{\beta}_i = (\mathbf{X}'\mathbf{W}_i\mathbf{X})^{-1} \mathbf{X}'\mathbf{W}_i\mathbf{y}$$

provide estimates for each variable k and each geographical location i .

$$\text{with } \hat{\beta}_i = \left(\hat{\beta}_{i0} \quad \hat{\beta}_{i1} \quad \dots \quad \hat{\beta}_{iM} \right)'$$

Spatial weight matrix

- \mathbf{W}_i : spatial weight matrix

$$\hat{\beta}_i = (\mathbf{X}'\mathbf{W}_i\mathbf{X})^{-1} \mathbf{X}'\mathbf{W}_i\mathbf{y}$$

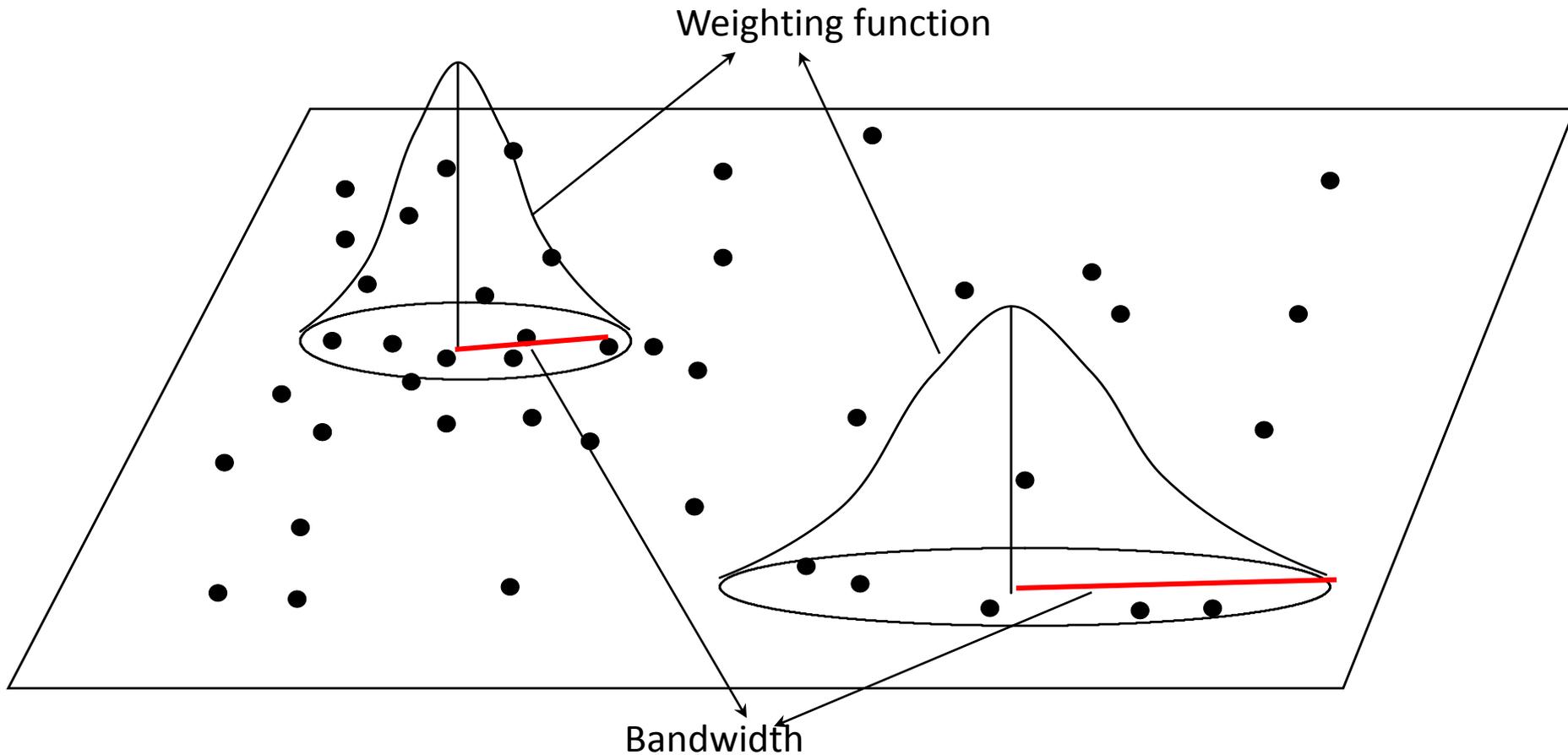
$$\mathbf{W}_i = \begin{bmatrix} w_{i1} & \dots & 0 & 0 \\ 0 & w_{i2} & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & w_{iN} \end{bmatrix}$$

- w_{i1} : weight of point 1 on the calibration of the model around point i

Selection of optimal bandwidths

spatially adaptive weighting function such as:

$$w_{ij} = \exp(-R_{ij} / h) \text{ where } R \text{ is the ranked distance}$$



Test on non stationarity

- Leung et al. (2000): pseudo F3 test for local stationarity
- global F-test of non-stationarity, as proposed by Brundson et al. (1999)

Variables

43 indicators referring to the following fields:

- Socio-economic;
- Agricultural:
 - Structure;
 - Production systems;
 - Labour and productivity.

Variables used in GWR

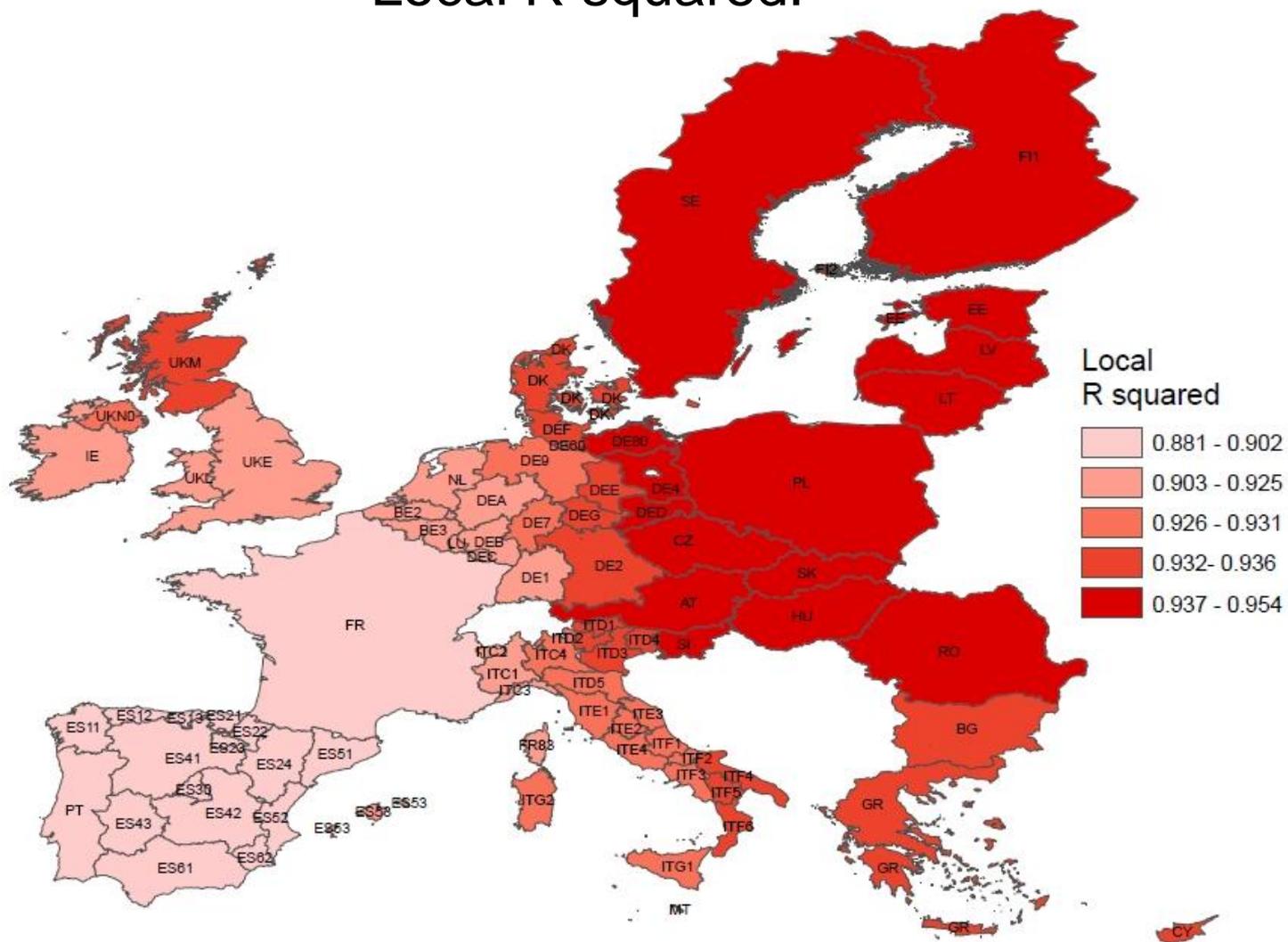
<i>Variable</i>	<i>Description</i>	<i>Source</i>	<i>Year</i>
<i>GVAagri</i>	Gross value added Agriculture (% total)	Regio	2005
<i>GVAindu</i>	Gross value added Industry (% total)	Regio	2005
<i>Denspop</i>	Population density	Regio	2005
<i>Ltunemp</i>	Long term unemployment rate	Regio	2005
<i>Nfa50ha</i>	% Holdings with ≥ 50 ha UAA	Regio	2005
<i>Aar50ha</i>	% UAA of holdings with ≥ 50 ha UAA	Regio	2005
<i>Oldhold</i>	% farms with holder aged more than 55	Regio	2005
<i>Cereals</i>	% UAA under cereals	Regio	2005
<i>Vineyar</i>	% UAA under vineyards	Regio	2005
<i>Bovifor</i>	Bovine animals over 1 year per ha of UAA under forage	Regio	2005
<i>DaicoUA</i>	Milk cows per ha UAA	Regio	2005
<i>SheeUAA</i>	Sheeps per ha UAA	Regio	2005
<i>GVAUAA</i>	Agriculture gross value added per ha UAA	Regio	2005

GWR results

<i>Parameter</i>	<i>Min.</i>	<i>Lwr Quart.</i>	<i>Median</i>	<i>Upr Quart.</i>	<i>Max.</i>	<i>Stationarity</i>
<i>Intercept</i>	-0.6478	0.1463	0.4113	0.5293	0.8848	No
<i>Aar5ha</i>	-1.0220	0.1486	0.4560	0.6647	1.0810	No
<i>Bovifor</i>	-0.0073	0.1552	0.3065	0.4052	0.5558	No
<i>Cereals</i>	-0.2841	-0.1496	-0.0243	0.0572	0.2454	No
<i>Oldhold</i>	-0.7947	-0.3294	-0.1162	0.0236	0.1339	No
<i>Nfa50ha</i>	-0.6628	-0.3566	-0.2095	-0.0807	0.1031	No
<i>SheeUAA</i>	-0.1489	-0.0756	0.0098	0.2478	1.3030	No
<i>Vineyar</i>	0.0672	0.1582	0.2098	0.2963	0.6134	Yes
<i>GVAagri</i>	-0.3732	-0.1149	0.1104	0.3784	0.8691	No
<i>GVAindu</i>	-0.3232	-0.1806	-0.0625	-0.0251	0.1671	Yes
<i>Ltunemp</i>	-0.4904	-0.2635	-0.1954	-0.1445	0.0276	Yes
<i>Denspov</i>	-0.2916	0.0909	0.4460	0.5179	1.5320	No

The clusters

Local R squared:



The clusters

The **overall aim** of the cluster analysis consists in **reducing the complexities of the territorial realities** in EU-27.

We have achieved a **balance between:**

- the **maximum of homogeneity within the clusters** and
- the **minimum possible number of clusters**

with a reasonable distribution of **homogeneous territorial units** involved in RD programming in each of them.

The clusters

We choose 13 clusters:



The Mediterranean System

The main features

- low level of socio-economic development (16% of total GDP);
- high contribution for both agricultural productivity (28.9% of the GVA) and employment (20.6% of agricultural employees);
- wide presence of small farms (22.7% of the total EU) and of ageing holders (26.5%).

Two sub-systems

- The southern Italian and Greek regions (cl. 11 and 1): higher agricultural productivity, but relevant structural problems (80% of small farms, ageing holders);
- The Spanish and Portuguese regions (cl. 7 and 8): lower agricultural productivity, but minor presence of structural problems.

The strategies in the Mediterranean System

22.7% of total budget of Pillar II

- Axis 1: large part of the funds;
- Axis 2: minor part of the funds;
- Axis 3: very low resources.

Budget for LEADER measures is high. This approach evidences the preference for the development planning from the bottom.

The strategies in the Mediterranean System

The breakdown of the measures under Axis 1:

- Measure 111: only 10-13%;
- Measure 113: very low resources;
- Measure 121: concentration of resources in cluster 1 and 11,
- Measures 123 and 125: in the Spanish and Greek ones.

In southern Italian and Greek regions the funds per hectare are higher (co-financing), except in Spanish and Portuguese regions.

The Peco Territorial System

The main features of Peco regions

- 6% of total GDP;
- a key role of agricultural sector with 50% of EU agricultural employees, but only 6% of total GVA;
- Relevant structural problems: small farms (68% of the total) and ageing holders (60%);

Two sub-systems

- Czech, Hungarian, Romanian, Bulgarian regions (cl. 12): small farms (over 90% of the total) and ageing holders (64%);
- In the Polish, Lithuanian, Estonian and Latvian regions (cl. 6): wide presence of small farms, but a large presence of young holders.

The strategies in the Peco Syetem

Almost 40% of the II Pillar of budget

Cluster 6 and cluster 12:

- Axis 1: among 20%;
- Axis 2: among 10%;
- Axis 3: 22,5% for cluster 6 and 27,7% for cluster 12 (67% of total resources).

The strategies in the Peco System

The breakdown of the measures Axis 1:

- Measure 111: Minimum (0,4% in cluster 6 and 2,3% in cluster 12);
- Measure 113: only in cluster 6 (26,3%);
- Measure 121: 47% in cluster 12 and 37% in cluster 6.

Funds per hectare of UAA: high, but lower than that in the regions ob. 1.

The Continental System

The main features

- 53% of total GDP;
- 43% of the GVA, but only 20% of EU agricultural employees;
- Irrelevant structural problems: 50% of UAA in large farms and the minimum of ageing holders (8%).

Two subsystems

- The Dutch and Belgian regions (cl. 3) and in German ones (cl. 2) : substantial absence of structural problems ;
- In the British and Irish regions (cl. 4) and French (cl. 9): presence of older holders and significant differences in agricultural productivity (cluster 4).

The strategies in the Continental System

25% of the budget of the II Pillar

Main resources are devoted to:

- Axis 1: low for all clusters except for cluster 9;
- Axis 2: higher resources, with the maximum in the cluster 4 (72%);
- Axis 3: higher resources in cluster 3 (25%).

The strategies in the Continental System

The breakdown of Axis 1:

- Measure 111: cluster 9 (26%);
- Measure 113: cluster 4 (16%);
- Measure 121: almost 50% of total resources;
- Measure 125: 42% in cluster 3.

The indicator per hectare is the smallest of the EU scenario but the funds of local institutions have almost doubled the EU funds.

Therefore, only through local and national intervention, the impact of these aids affects agricultural competitiveness in Dutch, Belgian and Irish regions.

Some conclusions

Under a methodological profile:

- the **spatial analysis** allowed to determine the indicators which have characteristics of non-stationarity in order to **define homogeneous groups of programming areas**, despite the difficulties related to the strong regional differences in dimension areas.

Some conclusions

- The **funds for local planning** of agricultural and rural development
 - are **still very limited** and
 - may not have a sufficiently strong redistribution effect in order to reduce disparities and consequently the structural differences existing in European agriculture.
 - This involve:
 - regions of the PECO countries (clusters 6 and 12), where the lack of financial capacity involves a minimum co-financing,
 - Partially the Mediterranean regions with strong differences in socio-economic development (cluster 1 and 11).
- In the continental regions local and regional institutions substantially increased EU aids, often more than doubled.

Some conclusions

Choice between Axis:

- in all the systems a **large part of resources** have been concentrated **in Axis 1**;
- excepted the **mountainous and northern territories** of the EU where decision makers preferred to substantially increase the budget of the **Axis 2** since the environmental protection is a priority;
- resources for **Axis 3** almost anywhere reach more than 20% of the budget for Pillar II, with the exception of the Mediterranean System.

Some conclusions

From a structural point of view, the main problems concern the ageing of the holders and the consequently necessary generational change. In this respect the choices contained in the plans highlight some results.

- The systems where the presence of **older conduction threatens** undermine competitiveness are often those where the **funds in the setting up of young farmers** (measure 112) **and early retirement** (size 113) **are lower**. In other words, since they faced with serious problems of competitiveness and the need of overcoming of regional disparities, the policy makers preferred to **direct resources** towards the **improvement of agricultural structures**.

Some conclusions

- An other **problem** is connected to **farm size** and their possibility to face out global competition. In this direction, **a large part of the resources in the Axis 1 was concentrated in measure 121** (farm modernization), which always exceeds one third of the total until more than 40% in cluster 12 and in cluster 10. Even in this case the **regions of ob. 1 of cluster 1, 7 and 8**, with large presence of farms below 5 hectares, devote **fewer resources to farm modernization**.



**THANKS FOR YOUR
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