Agricultural systems in the European Union: an analysis of regional differences

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Jel Classification: O18, P25, R12, R14

Abstract

The recognition of agricultural and territorial systems is essential to define regional development programs. The analysis of their characteristics is particularly relevant in a period when the new Common Agricultural Policy (CAP) is going to be designed and planned.

Present research tries to identify and analyse the main structural agricultural models within the European Union, whose classification could be useful to define policies and tools of intervention, in view of the new programming period (2014-2020). The research is focused on the analysis of agricultural features in 247 regional areas (NUTS 2) of all European countries; it has been carried out adopting a Principal Components Analysis (PCA) to identify the main factors that differentiate agricultural systems in EU countries, taking into account a specific set of social and economic indicators.

Afterward, by applying cluster analysis on the results of PCA, we classified the different regional areas into homogenous groups.

The results allow a general classification of "homogeneous agricultural areas", whose categorization may be useful to better understand the characteristics of the European Union countryside and better orientate the planning of the new CAP.

***Keywords**: Rural areas, farming systems, regional development, regional policies, CAP, NUTS 2.*

Résumé

La reconnaissance des systèmes agricoles et territoriaux est indispensable à la création de programmes de développement ruraux, en particulier à un moment où la nouvelle Politique Agricole Commune est en train d'être redéfinie. La recherche actuelle tente d'identifier et d'analyser les modèles agricoles structurels principaux au sein de l'Union européenne.

Compte tenu de la nouvelle période de programmation (2014-2020), une telle classification pourrait se révéler utile dans le but de définir des politiques et de créer des outils d'intervention.

La recherche se concentre sur l'analyse des caractéristiques agricoles des 247 zones régionales (NUTS 2) des pays européens et elle a été réalisée à l'aide d'une Analyse en Composantes Principales (ACP) qui, grâce à toute une série d'indicateurs économiques et sociaux distinctifs, identifie les facteurs principaux permettant de différencier les systèmes agricoles au sein de l'UE.

Puis, une analyse typologique est réalisée, cette dernière nous permet de mettre au point une classification des différentes zones régionales en groupes homogènes. Les résultats permettent une classification générale des « zones agricoles homogènes » qui peut se révéler très utile pour mieux comprendre les caractéristiques des campagnes de l'Union Européenne et mieux orienter l'élaboration de la nouvelle PAC.

Mots-clés: zones rurales, système de culture, développement régional, politiques régionales, PAC, NUTS 2.

1. Introduction

In the last two decades, a new approach toward agricultural policies was adopted by the Common Agricultural Policy with the aim to improve the competitiveness of the agriculture and support long-term livelihood of rural areas as a whole, linking agriculture subsidies to environmental sustainability (Lowe *et al*., 2002; Signorello and Pappalardo, 2003; Dwyer *et al*., 2007).

This process of CAP reform process has been characterized by a slow and progressive changeing in the way agriculture was supported, by a gradually reduction of price and market intervention and a progressive moving shift towards decoupled payments on one side, and the reinforcement of Pillar II aimed at the enhancement of endogenous resources of rural areas, on the other side.

In this context, the current Commission proposals for the new CAP (2014-2020) aim at further integrating environmental objectives into farms activities in order to better respond to EU's growth strategy (Europe 2020) and at increasing the competitiveness of agricultural sector through the identification of more efficient production models (European Commission, 2011a; 2011b). The reform proposals introduce some elements that could have major effects on support distribution within farms of European countries. First, the level of the support per hectare should be progressively adjusted in order to reach the convergence at national or regional level. Secondly, though the structure of the two Pillars has been kept substantially unchanged, both pillars should play a role in pursuing environmental objectives. A "greening component" of direct payments has been introduced; and it should account for 30% of the direct payments national ceiling. Moreover, a higher flexibility between Pillars is allowed and Member States may decide to additionally support Rural Development Programs, financing them with up to 10%[1] of the annual national ceiling available for direct payments. Finally, the introduction of capping, on one side, and of small farmers scheme, on the other side, will likely have effects in terms of the farm support level and these effects will differ at territorial level, according to the structure of the agricultural sector.

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[1] Up to 15% according to COMAGRI compromise amendments of January 2013.

One of the most important challenges that the new CAP has to face is to meet the needs of different European agricultural and rural areas: the choice of policy tools and of the way they are implemented is not neutral with respect to the equity of support distribution as well as to the policy effectiveness.

In this context, the recognition and identification of agricultural systems (D'Amico and Sturiale, 2002) becomes a relevant issue either in order to define needs, and then policies and tools of intervention, in view of the new programming period (2014-2020), as well as to evaluate whether the Commission proposals on new aids scheme fit the one or the other agricultural system. As a fact, the relevance of regional differences has been traditionally recognized in rural development planning. Regions are an essential dimension of the development process (Scott and Storper, 2003) and region typologies are a common tool to define similar policy needs and instruments (Verburg *et al.*, 2010). Regional differentiation is still relevant to assess the way direct aids are envisaged and to support the analysis of agricultural policies impact, highlighting disparities or inefficiencies among the regions.

The classification of EU agricultural systems is the main objective of the present study, that is focused on the analysis of agricultural features in 247 regional areas (NUTS 2) of all European Union countries. It has been carried out adopting a Principal Components Analysis (PCA) methodology to identify the main factors of differentiation of agricultural systems in the EU countries, taking into account a specific set of social and economic indicators. The indicators employed in this study are referred to the agricultural context, concerning social, demographic and economic factors and they have been derived from EUROSTAT and other official statistical sources. Afterward, by applying cluster analysis on the PCA results, we classified the NUTS 2 regions into homogenous groups in order to understand if the new CAP proposals are appropriate to the local needs of each European region.

2. Methodology

In recent years the EU rural areas have been characterized by several development patterns and different policies tools have been adopted by each country as a means to reach economic development in rural regions, above all in advanced countries (Terluin, 2003).

Studies on efficiency and productivity changes in EU rural regions have been carried out taking into account different analysis perspectives (Serrao, 2003); related to that, different indicators have been suggested that can be referred to factors that are responsible for differences in economic performance among rural areas (Bryden, 2002). General patterns of rural development have been examined using specific indicators; and different methodologies have been applied to identify the rural features of European (Bryden, 2002; Ballas *et al.,* 2003; Winters *et al*., 2008) and extra-European regions (Porter, 2003; Gülümser *et al.*, 2006).

Assuming that EU rural development policies are mainly targeted at farms, on one side, and that structural and production features affects both the efficacy of policy aids and the role they play for the farm economic sustainability and development perspectives, in this work we focused on *farms the socio economic structure* in order to characterize and identify territorial agricultural systems. The indicators employed in this study are referred to the agricultural context, concerning social, demographic and economic factors. The data have been derived from EUROSTAT, European Commission and other official statistical sources.

The socio-economic indicators have been selected in order to describe the socio-economic structure of European farms, and have been divided into the following five groups:

– land use;
– physical farm size;
– economic farm size;
– livestock;
– social and demographic features of agricultural context.

Within these categories we have identified 27 indicators listed in the table 1.

Table 1 - *Indicators of socio-economic structure.*

Group of indicators	Indicators
Land use	% arable land % permanent grass land % permanent crop area % irrigable area (irrigable area/Utilised Agricultural Area) % Mediterranean permanent crops (citrus and olive tree area/permanent crop area) % vineyards area (vineyard area/ permanent crop area)
Physical farm size	Average physical farm size (ha/farm) % of holdings with less than 5 ha UAA % of holdings with 5 ha to less than 50 ha UAA % of holdings with 50 ha UAA or more
Economic farm size	Average economic farm size (ESU/farm) % of holdings with less than 2 ESU % of holdings with 2 ESU to less than 100 ESU % of holdings with 100 ESU or more Importance of semi-subsistence farming (% of farm < 1ESU)
Livestock	Livestock sector: Average number of LSU per farm (LSU/farm) % of total cattle holdings (total cattle holdings/ total holdings with livestock) % of dairy cows holdings (dairy cows holdings/ total holdings with livestock) % of sheep-goats holdings (sheep-goat holdings/ total holdings with livestock) % of beef cows holdings (beef cows holdings/ total holdings with livestock)
Social and demographic features of agricultural context	Training and Education in Agriculture (% of managers with basic or full agricultural training) Age structure of regional population (% less than 14 years old) Age structure of regional population (% 15-64 years old) Age structure of regional population (% ≥65 years old) Dependency ratio (sum of population less than 15 years and 65 years or over related to population from 15 to 64 years old) Age structure in agriculture (farmers < 35 years old/ farmers ≥ 55 years old) % of Employment in Primary Sector (primary sector employees/ total employees)

The multiplicity of indicators and the high number of variables can make very complex a spatial statistical analysis. In this respect, we adopted specific multivariate analysis techniques to simplify the structure of data, with the aim to highlight and identify a smaller group of variables (real or latent) (Johnston, 1979; Moller, 1995).

The research, focused on the analysis of territorial development process in 247 regions of 27 European countries, has been carried out adopting a Principal Components Analysis (PCA) as a mechanism to identify the main factors of rural systems in EU countries, taking into account a set of 15 social and economic indicators, extrapolated from the list reported in Table 1. Afterward, by applying *cluster analysis* (CA) on the most representative ratios, selected through the PCA, we set and characterized the different rural areas into homogenous groups. Combined or separated application of the above-mentioned methodologies has been employed in many researches focused on rural economics and regional studies (Hyttinen *et al*.; 2000; Ballas *et al*.; 2003; Gülümser *et al*.; 2006; Winters *et al*.; 2008; Davidova *et al.,* 2009). As a fact, PCA allows to synthesize specific information from all of the basic variables in a smaller set of new variables (the so- called principal components), while CA allows to synthesized taxonomic groups in a "homogeneous" cluster (Johnston, 1979; Moller, 1995).

3. Results

3.1. The Principal Component Analysis

Starting from 15 variables, by means of the PCA, 4 components were extracted that explain 67.2% of the total variance. Table 2 shows the matrix of rotated components loadings[2] that represent the correlation indexes among the initial variables and each of the components. These components represent the differentiation factors within the whole variables system in question.

The first component (24.8% of the explained variance) identifies the level of *professional agriculture*. As a fact, this component is positively related to the percentage of holdings greater than or equal than to 50 hectares of Utilized Agricultural Area, the higher economic size (100 or more ESU), the percentage of managers with basic or full agricultural training. These farms are mainly operating in the livestock sector, and more specifically in the beef sector. Furthermore, social indicators help to better characterize the component and to understand the relationship between the agricultural sector and the economic context in which it acts: the negative correlation with the share of employment in the primary sector helps to localize this agriculture in a more developed economic context. That means that from negative to positive values of the first component, we pass from less developed areas, where the agriculture is relatively more relevant in terms of employment but weaker in terms of income, to higher level developed areas, characterized by an higher rate of professional agriculture.

Information on specific productions is given by other components.

The second one explains 15.6% of total variance and identifies *dairy production and young agriculture*. This component is positively correlated with the percentage of dairy farms, whose size is included between 5 and 50 hectares of UAA. Moreover, the indicators that better characterize the components are related to the farmer, as there is a positive correlation both with the ratio between farmers less than 35 and more than 55 years old and with the percentage of more trained farmers.

The *Mediterranean agriculture* is synthesised by the third component that represents 15.5% of total variance. Positive values of the components are related to areas whose permanent crops, particularly olive and citrus growing, represent a significant share of the UAA. However, this component includes areas that can be very different in terms of natural resources, quality production and economic sustainability. On the one hand, a positive correlation with the percentage of irrigable UAA identifies a good soils fertility that can be fairly linked to fruit and more intensive growing. On the other hand, the third component is positively related to olive growing, as well as to the sheep-goat holdings, that characterize a more extensive agriculture. The correlation with the dependency ratio underlines that this type of agriculture is mainly localized in areas whit a weaker social and demographic structure.

Some of these characteristics are even more evident in the fourth component (11.3% of the explained variance) that better represents the *extensive agriculture in a weak context*. This component shows a positive correlation with the percentage of permanent meadow and pastures, with the highest share of beef, sheep and goat holdings with respect to the total of livestock farms, and with the level of dependency ratio. Then, moving from negative to positive values of the component, we observe an increasing importance of extensive livestock farms, and, at the same time, a more dependent demographic structure. The level of weakness of the social context of this agriculture depends on the relative weight of "dependency ratio" (age population components).

3.2. The cluster analysis

The next step of the work, as mentioned above, was the application of a cluster analysis to the factor scores in order to aggregate European regions (NUTS 2) according to the homogeneity with respect to the different agricultural features previously identified through the PCA.

Cluster analysis includes different methods and algorithms for grouping the observations (the regions, in our case). In this work, the K-means method was used, a non-hierarchical method that, unlike the hierarchical ones, allows for the re-assignment of units after each step, and min-

[2] Components were rotated using the Varimax method. This method allows to obtain orthogonal factors and makes the interpretation of the components easier by minimizing the number of variables related to each of the extracted components.

Table 2 - *Component loadings matrix.*

Indicators	Components			
	1	2	3	4
% permanent grass land	-0.040	0.056	-0.154	0.848
% permanent crop area	-0.263	-0.257	0.731	-0.134
% irrigable area (irrigable area/Utilised Agricultural Area)	0.019	-0.078	0.714	0.307
% Mediterranean permanent crops (citrus and olive tree area/permanent crop area)	-0.277	-0.224	0.778	0.090
% of holdings with 5 ha to less than 50 ha UAA	0.390	0.600	-0.020	0.284
% of holdings with 50 ha UAA or more	0.803	0.082	-0.208	0.115
% of holdings with 100 ESU or more	0.836	0.216	-0.001	-0.200
Livestock sector: Average number of LSU per farm (LSU/farm)	0.846	0.034	-0.038	0.006
% of dairy cows holdings (dairy cows holdings/ total holdings with livestock)	0.005	0.781	-0.229	0.053
% of sheep-goats holdings (sheep-goat holdings/ total holdings with livestock)	-0.004	-0.388	0.492	0.421
% of beef cows holdings (beef cows holdings/ total holdings with livestock)	0.581	-0.075	-0.176	0.551
Training and Education in Agriculture (% of managers with basic or full agricultural training)	0.632	0.628	-0.218	-0.134
Dependency ratio (sum of population less than 15 years and 65 years or over related to population from 15 to 64 years old)	0.478	0.045	0.417	0.410
Age structure in agriculture (farmers < 35 years old/ farmers ≥ 55 years old)	-0.133	0.785	-0.177	-0.127
% of Employment in Primary Sector (primary sector employees/ total employees)	-0.612	0.161	0.152	-0.195

Note: KMO's test = 0.736; Bartlett's test of Sphericity = 1888.09 Sig. .000

imizes the variance within each cluster for all clusters. The assignment algorithm was based on the *nearest centroid sorting*: cluster centroids are estimated in an iterative way and each unit is assigned so that its distance from the centroid is minimized.

One limit of non-hierarchical methods is that they require specifying *a priori* the number of groups to be formed, leaving room for the subjectivity and the expertise of the researcher (Cannata G., 1995; Coppola A., 1999). The decision of how many clusters shall be formed can be derived by running the algorithm repeatedly with different numbers of groups and comparing the results in terms of distance within and among the groups. Based on that, in our work we got 6 groups, whose characteristics are synthesised by the values of the centroids (table 3).

The first group, *extensive northern EU agriculture* (figure 1), is the largest one (60 units) and is mainly characterized by component 2 (with negative sign) and component 4 (positively signed). Therefore, the agriculture of this group of regions is more extensive, with a high percentage of permanent meadow and pastures oriented to meat production (beef and goat livestock). Regions of this group belong to different territorial contexts (UK, Spain, Sweden), but the group mainly reflects the UK agriculture, representing 53% of the regions included. Besides the extensive production, this agriculture is characterised by the presence of large size farms (the share of holdings with 50 hectares or more is higher than the EU average), but shows a weakness point in its human capital, as the ratio between younger and older farmers is among the lowest of at EU level (7%), and it is similar to that observed in group 4.

The high positive value of the first component synthesises the features of the second group that includes 56 regions and represents *the core of EU continental agriculture* (figure 2). This is the agriculture of France, Belgium, Denmark and Netherlands, based on farmers with the highest level of training (58% have a specific agriculture degree or education), on farm with a relevant economic size (25% of holdings has a size equal or more than 100 ESU) with wide livestock presence (both cows and beef livestock), and a good fertility of agricultural soils (12% of the UAA is irrigated).

Extensive agriculture features (component 4) strongly characterise the third group - *the mountain agriculture* (figure. 3) - which includes 24 regions. Moreover, regions of group 3 are characterized by a relatively smaller farm size (negative value of the first component), while the positive value of the second component suggests that these regions are oriented to dairy production. Differences in social and demographic characteristics can also be observed: in group 3 the employment function of the agricultural sector is slightly more relevant and farmers are relatively younger and more skilled. No specific country identifies this group, but mountain areas seem to be associated with it, such as the Atlantic mountain area of the Iberican peninsula (Galicia, Asturias and Cantabria) and French, Austrian and Italian Alps.

Groups from 4 to 6 are the ones where the agriculture reaches the highest EU employment share (9.4%, 13.4% and 11.6%, respectively).

Productive characteristics are very different in group 4 (45 regions), where component 3 gets the highest positive value.

Table 3 - *Values of final cluster centres.*

	Cluster					
	1	2	3	4	5	6
Professional agriculture	0.411	1.282	-0.400	-0.527	-1.084	-0.932
Dairy production and young agriculture	-0.629	0.445	0.878	-0.486	-0.609	1.930
Mediterranean agriculture	-0.392	0.036	-0.332	1.664	-0.926	-0.371
Extensive agriculture in a weak context	0.774	-0.554	1.350	-0.061	-0.901	-0.407
Number of regions	*60*	*56*	*24*	*45*	*41*	*20*

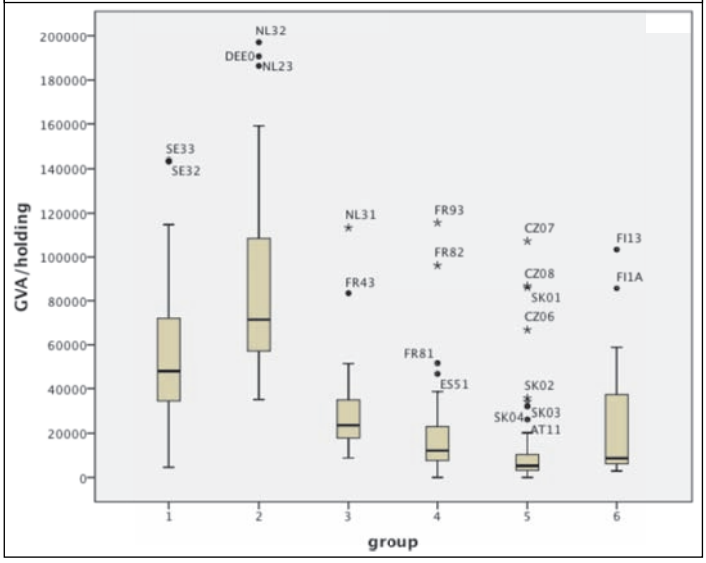
Crop production represents the 29% of UAA (with respect to 7.4% at EU level) and Mediterranean crops (olive and citrus) stand for 50% of the permanent crops area. Sheeps and goats are also relevant in livestock farming. Farm average size is lower than the previous groups but quality of soils is higher and 27% of the UAA is irrigated. This cluster includes the entire Greece, most of the Italian and Spanish regions, Portugal and Cyprus (*Mediterranean agriculture of Southern EU*) (figure 4).

Negative values of all the components distinguish the fifth group (41 regions) characterised by an *semi-subsistence agriculture* (figure 5). Here, even if the agriculture plays important role in terms of employment (13% of the total), the sector shows many weakness factors: the physical structure corresponds to micro/small size, land use is not specialized, profitability of labour and land are the lowest within the EU and the farmers' training and educational level is slightly low. This type of agriculture is preferentially situated in regions of the Eastern EU countries (Bulgaria, Hungary, Poland and Romania).

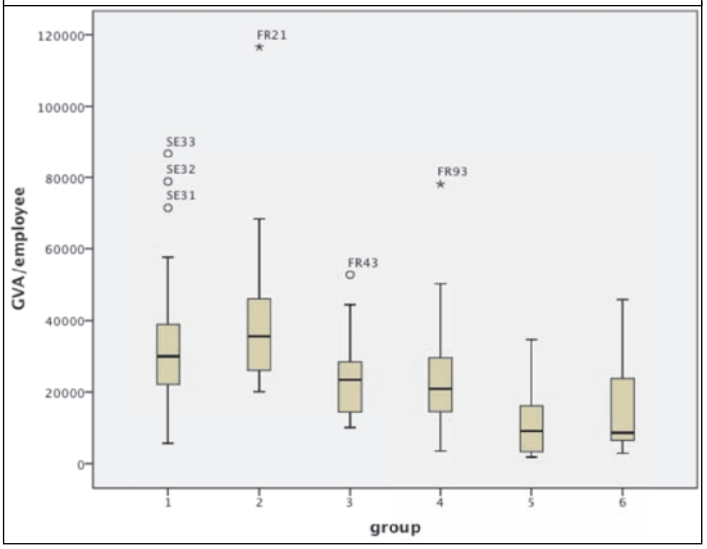
The sixth and last group includes 20 regions (*medium dairy agriculture*) (figure 6). The negative value of component 1, besides the higher agricultural employment share, is mainly related to the lowest presence of larger farms, to the smallest livestock farm size and to the lowest dependency ratio. The effect of these indicators hides the action of the farmers' training and education level that is the highest within the EU. Besides that, factors that better identify the group are the dairy production, that is carried out in 47% of the livestock farms, and the ratio between very young and older farmers, that reaches the 37% of the total. The regions included in group 6 are Bayern and Baden-Württemberg in Germany, the regions of North-East Poland and Finland.

The groups show significantive differences not only in terms of physical structure and production systems, but also in terms of income capability and labor productivity.

Graph 1 - *Distribution of GVA per holding by groups (data in euro).*



Graph 2 - *Distribution of GVA per employee by groups (data in euro).*



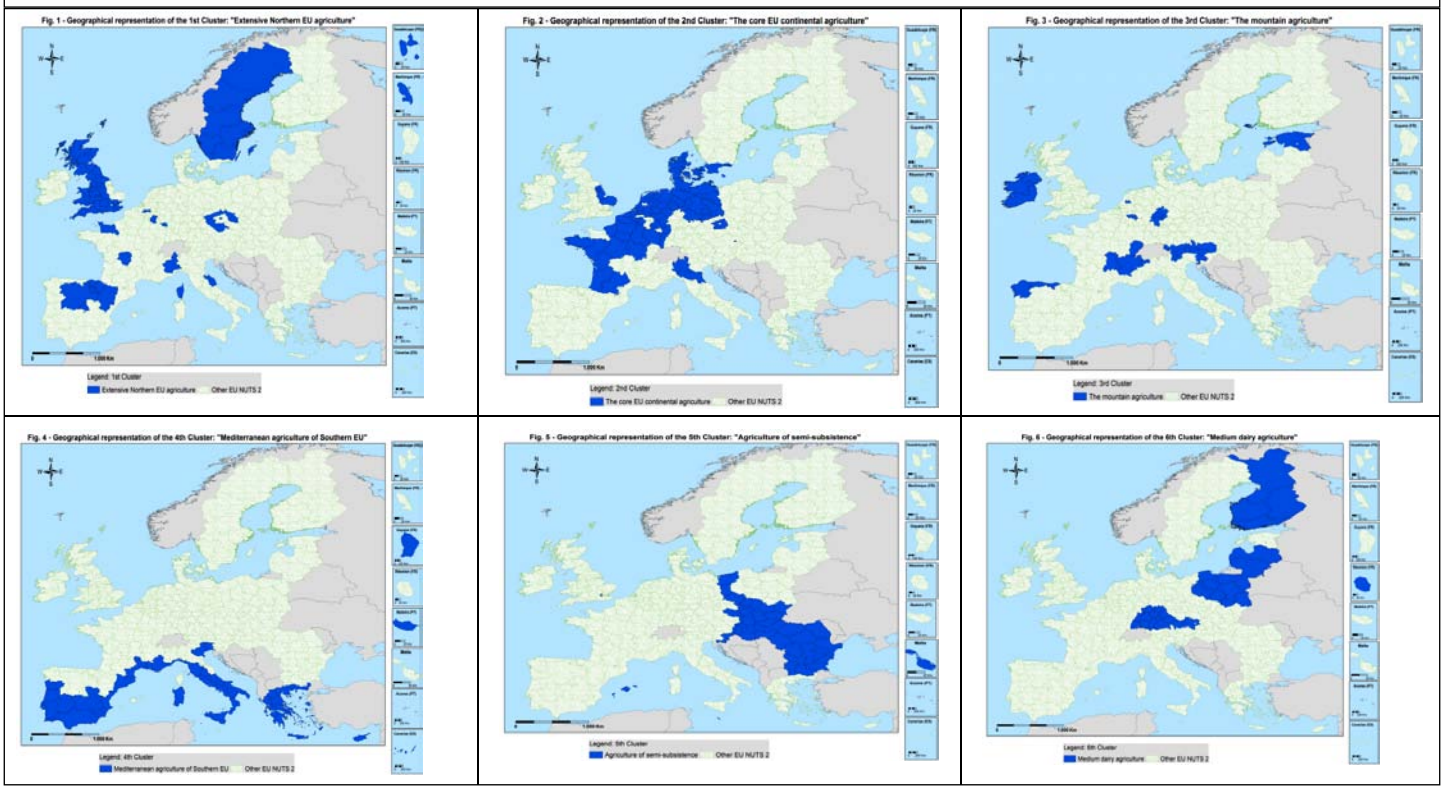
By means of Kruskal-Wallis test, distributions of GVA per holding and per employee are proved to be statistically different among groups (GVA/holding: χ^2 = 123.690 Sig. =.000; GVA/employee: χ^2 = 91.191 Sig. =.000). Pairwise comparison of GVA per holding highlights that this result is mainly related to clusters 1 and 2, whose distributions are significantly different with respect to the other groups, while they are very similar between themselves. As to GVA per employee is concerned, on one side most significant differences characterize groups 5 and 6 with respect to the other ones; on the other side, groups 3 and 4 have more similar distributions between themselves. That is is graphically presented in graph 1 and 2.

4. Conclusion and policy implication

The paper aimed at drawing a picture of European agricultural systems at NUTS 2 level and allowed to identify 6 regional agricultural models: "extensive northern EU agriculture", "EU continental agriculture", "mountain agriculture", "Mediterranean Southern EU", "subsistence agriculture" and "medium dairy agriculture". The lower/higher professional level in the agricultural activity, the intensity of the production system and some farmer characteristics represent relevant differentiation features among the clusters that can be basically related to the average size, in terms of surface and economic size (ESU), as well as to farmers training and educational level.

The physical structure has a significant effect on farm profitability, in terms of GVA per holding and per employee: *extensive northern EU agriculture* (group 1) and the *EU continental agriculture* (group 2) are characterized by both larger farms and higher profitability indexes, while in *semi-subsistence agriculture* regions (group 5) the micro/small farm size is strongly related to the lowest levels of GVA per holding and per employee. Farm profitability is related to the quality of human capital, too. A lower education level especially characterizes the *Mediterranean Southern EU*

Figures 1 to 6 - *Maps of the EU region by group.*



(group 4) and *semi-subsistence agriculture* regions (group 5), where the GVA per holdings and the GVA per employee are the lowest, respectively. Even the productive specialization affects the economic performance and that is particularly true when Mediterranean agriculture is considered with respect to other agricultural specializations.

These findings confirm that policy design might not consider the European agriculture as a whole, but it should take into account productive and structural specificities, as well as the different socio-economic contexts in which agricultural systems operate. That is true with respect to rural development policies, but is even more relevant when direct aids are concerned. An analysis of the first pillar reform is beyond the aim of this work. However, two main remarks can be pointed out.

First of all, the CAP reform is proposing a basic payment that should still be related to the eligible surfaces. This payment keeps the nature of the current decoupled aid, that is a rent (Sotte, 2005), and will continue to mainly benefit larger holdings, as those included in groups 1, 2 and 3 of our work. If CAP reform aims to provide European farms with more equitable support, the basic payment seems not to assure it. The capping does not seems to be a sufficient tool in this direction. Our analysis showed that farm structural differences are strongly related to different regional systems. As a consequence, disparities in the level of farm support translate in territorial disparities of aids at the farm level. Relevant differences among regional systems also exist in terms of holdings' income capability and labor productivity, too. A policy following equity criteria should take into account these differences; it requires a much wider flexibility of instruments, as the basic payment by itself cannot ensure it. However, a preliminary step in defining agricultural policies and tools is to clarify the objectives that CAP Pillar I aims to pursue. As market and price policy has mainly changed towards a direct support, the link between objectives and present tools became less clear-cut. Are CAP aids aimed at guaranteeing an adequate level of farm income or should they guarantee an adequate level of land use? Do we want to preserve some specific agricultural systems or are we interested to in preserveing agriculture by itself? Should CAP aids address adjustment processes to increase competitiveness or should they keep in life weaker situations? The one or the other answer to these questions affects the tool to be implemented and the way it should be applied with respect to the agricultural systems. These themes seem to be neglected in the current debate on CAP reform proposals.

Secondly, even the distinction between Pillar I and II in terms of objectives has become less evident and the EC reform proposals seem to reflect it. The policy debate is more and more focusing on the environmental role that agriculture should play and the proposal of Pillar I reform translates that into a "green payment", allocating up to 30% of annual national ceiling. There is no doubt that the proposed green rules better fit the extensive and mountain agricultural systems and larger holdings. On the contrary, intensive, small and medium farms may have more operative and e-

conomic obstacles to apply them, and for these farms the implementation of environmental objectives could conflict with the aim of increasing the economic competitiveness that the Commission declares to pursue, too. The debate between the EU Commission and Parliament that followed EC proposals has partially reviewed the green payments rules, taking into account Mediterranean agriculture, on one side, and differences in regional farms structures, on the other side. The approach, though, has not changed, as a green payment proposal in order to be effective should better be based on the analysis of the different agricultural systems and their specific environmental issues.

Therefore, while the new CAP reform introduces some positive and innovative elements, it fails to take into account the several features that differentiate and characterize the EU regional "agricultures".

References

Ballas D., Kalogeresis T. and, Labrianidis L., (2003). *A comparative study of typologies for rural areas in Europe*., Paper submitted to 43rd European Congress of the Regional Science Association*,* Jyväskylä, Finland, 27-30 August 2003.

Bryden J., (2002). *Rural Development Indicators and Diversity in the European Union.*, Paper presented at the conference on "Measuring rural diversity". Washington, DC.

Cannata G. (ed.Edited by), (1995). *I sistemi territoriali agricoli degli anni '90. Contributi metodologici*., C.N.R. RAISA., Cosenza : Rubbettino eEditore, Cosenza.

Coppola A., (1999). Differenziazione delle aree rurali e politiche di sviluppo: un'analisi per la regione Campania. In:, Seminario Internazionale "*Territorio, ambiente ed impresa agricola: modelli di gestione per lo sviluppo rurale*", Perugia, 29 aprile 1999.

D'Amico M. and, Sturiale L., (2002). Sviluppo e differenziazione territoriale delle aree rurali in Sicilia: analisi e prospettive., Iin: Basile E. and Romano D. (eEds.ited by). "*Sviluppo Rurale: Società, Territorio, Impresa.* Milano: ", Franco Angeli, Milano; pp. 190-206.

Davidova S., Fredriksson L. and, Bailey A., (2009). Subsistence and semi-subsistence farming in selected EU new member states., *Agricultural Economics*, 40, : 733-744.

Dwyer, J., (2007.) Chapter 3 Agriculture. In:*,* in OECD, *Subsidy reform and sustainable development: political economy aspects*., Paris : OECD, Paris. 69-89.

European Commission, (2011a). *Communication from the Commission to the European Parliament and the Council, enlargement strategy and main challenges 2011-2012.,* Brussels, 12.10.2011, SEC (2011), 1201 final.

European Commission, (2011b). *Proposal for a Regulation of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development* (EAFRD)., Brussels, 19.10.2011 , COM(2011) 627 final/2.

Gülümser A. A., Baycan Levent T. and, Nijkamp P., 2006. Turkey's rurality: a comparative analysis at the EU level. In:, *46th Congress of the European Regional Science Association Enlargement, Southern Europe and the Mediterranean,* 30 August-3 September 2006, Volos, Greece.

Hyttinen P., Niskanen A. and, Ottitsch A., (2000). New challenges for the forest sector to contribute to rural development in Europe., *Land Use Policy*, 17 (3):, 221-232.

Johnston R. J., (1979). *Multivariate statistical analysis in geography*., New York:, Longman Group.

Lowe P.,, Buller, H., and Ward, N., (2002). Setting the next agenda? British and French approaches to the second pillar of the Common Agricultural Policy., *Journal of Rural Studies,* 18:, 1-17.

Moller F., (1995). *Analisi multivariata lineare*., Franco Angeli:, Milano.

Porter M. E., 2003. The economic performance of regions., *Regional Studies*, 37:, 549-578.

Scott A. J. and, Storper M., (2003). Regions, globalization, development., *Regional Studies*, 37:, 579-593.

Serrao A., (2003). A comparison of agricultural productivity among European Countries., *New Medit*, 1:, 14-20.

Signorello G. and, Pappalardo G.,, (2003). Domestic animal biodiversity conservation: A case study of rural development plans in the European Union., *Ecological Economics*, 45 (3):, 487-499.

Sotte F., (2005). La natura economica del PUA., *Agriregionieuropa*, Anno 1(, Numero 3).

Terluin I. J., (2003). Differences in economic development in rural regions of advanced countries: an overview and critical analysis of theories., *Journal of Rural Studies*, 19 (3):, 327-344.

Verburg P. H., van Berkel D.B., van Doorn A. M., van Eupen M. and, van den Heiligenberg H. A. R. M., (2010). Trajectories of land use change in Europe: a model-based exploration of rural futures., *Landscape Ecology*, 25 (2):, 217-232.

Winters P., Essam T., Davis B., Zezza A., Carletto C. and, Stamoulis K., (2008). *Patterns of rural development: a cross-country comparison using microeconomic data.*, Rome: FAO., ESA Working Paper Paper,n. 008-06.