# A REGIONAL ANALYSIS OF AGRICULTURE IN THE EEC

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ABSTRACT
*This paper aims to outline the regional configuration of agriculture in the EEC, and the analysis is focused in particular on the determinants of agricultural performance and efficiency. It is an attempt to map out regional disparities and affinities in the agricultural sector with the use of internationally comparable data referring to number of selected indicators.*

*The methodology used is centred around factor analysis (method of the principal components) and regression. It would have been possible to touch more deeply on issues of regional policy if detailed time series data had been available.*

*Nevertheless, the results obtained confirm that a more articulated knowledge of regional imbalances is needed and they also claim that further research should be carried out to improve the dynamic aspects of the analysis.*

## 1. Aims of research [1]

Despite the growing importance of the regional dimension in the European Community, a structural analysis and its impact on agricultural policies has rarely been carried out on a larger than national scale. Yet, as is well known, states, particularly the larger ones, display great internal heterogeneity in terms of resources and levels of development, which can be fully understood only by going into detail. Furthermore, on a regional level the analysis can provide new and original perspectives of agriculture from which new classifications and new territorial aggregations (transnational) can be made, thus allowing a better comprehension of the agricultural interests involved.[2] It is evident that this exercise helps to overcome the narrow-minded view that the European Community is simply a summation of single states.

When making the analysis on a regional level, a 'statistical' advantage is obtained: the large number of observations allows the application of quantitative methods which would not be otherwise applicable with only 12 observations, one for every member state. Nevertheless, this approach does have its drawbacks since data used in this present work, published by Eurostat, is often scarce, not always homogenous or comparable and therefore often the researcher finds himself obliged to adapt his analysis to the available sources of information. Moreover, current data sources do not permit detailed analysis and space-time comparisons since nearly all the available series start from the year 1983.

The outline of the research results obtained up to now is the following. Section 2 describes the territorial context in which the different agricultures are included. In the next section the results of the analysis of structural determinants and regional agricultural performances are discussed, after recalling the methods of multivariate analysis used in the research. The final chapter summarizes the main results and is dedicated to several conclusive considerations.

## 2. Territorial References

The first problem which had to be faced, obviously keeping in mind the limits of statistical sources mentioned above, was that of the territorial units of reference (regions). Tab 1 outlines the possible alternatives.[3]

The level NUTS II, which in Italy corresponds to the administrative regions, was adopted also for France and Spain; for Great Britain and Germany it seemed opportune to use the regional subdivision of level I, given that the standard regions and the 'lander' appeared to be more comparable, for average areas and population, with the remaining regions and most of all because only in this way could the necessary statistics be made available.[4]

The other states, either because of their smaller size (Belgium, Holland, Luxembourg, Denmark) or due to the scarcity of available data (Ireland, Portugal, Greece) were taken into consideration as one single region.

An initial quantification of the disparities among the EEC regions and their links with the relative dimensions of the agricultural sector can be seen in Table 2 where the rate of agricultural employment, GDP per head and the intensity index of regional problems (index calculated by the European Commission) are represented.[5]

It is worth noting that a close inverse correlation exists between the level of economic development and the relative importance of agriculture. It can also be seen, with the help of the index expressed in classes on Fig. 1 that the regions with the highest degree of problems (class 5) are situated in the Southern periphery and in the west of the Community, and they occupy a large area. On considering together classes 4 and 5, which include regions with problems whose intensity is above average, it is possible to establish two large 'problem areas': the first is essentially composed of a vast block of mediterranean regions (the South of Italy, Greece, Spain and Portugal), the second consists of Ireland and some regions of the United Kingdom.

In the first case we are dealing with particularly disadvantaged regions as they are 'peripheral' and slow in development, often situated far from important centres of demand and supply (with higher costs and longer time periods for storage, transport and supplies, smaller economies of scale and greater difficulties of access to information). In these regions unemployment is nearly always higher than the Community average and the productive structures are still today strongly orientated towards agriculture. Income and labour productivity are consequently at the bottom of the regional classification, while firms investments and economic infrastructures are often inadequate to create new employment, to increase productivity and the competitive edge.[6] The fact that the whole territory of the two new member states of Spain and Portugal, even though their intensity and modalities differ from region to region, is found among the zones characterized by the most unfavourable social-economic conditions, constitutes the sign of a sharpening in the regional disparities of the enlarged Community compared to those of the EEC-10. Seen from this point of view, any further, future enlargements of the EEC (especially in the direction of former Centrally Planned Economies) will not help to reduce the gap.

The second area, of more limited dimensions, appears to be cha_acterized by problems of a different nature. Even though it has medium levels of income or even sometimes above average, these regions show high levels of unemployment stemming from problems of structural adjustment in specific industrial sectors. These are 'Declining industrial regions', which are experiencing the consequences of the reconversion of traditional industrial sectors: however, in contrast with 'Peripheral lagging regions', the former benefit from advantages of agglomeration and possess in general, much more developed infrastructures.[7]

As already mentioned, national borders themselves often contain regional situations that are particularly diversified. Considering this, the situation of Italy is emblematic, because it shows examples of all classes of the index : as one proceeds from North towards the South a gradual increase is registered in the intensity of regional problems, with minimum points in the Po valley and Venetian area - and with features similar to those of the best regions of France, Germany, Holland and Denmark - and maximum points in the area of the South. In the same direction there are increases in the gap in incomes, productivity, competitivity and employment.

Great Britain is also characterized by an analogous heterogeneity of regional structures, whereas the social and economic conditions of the countries of the Centre-North area are decisevly more homogeneous. The position of Germany is also significant, whose 'landers' mainly belong to the superior class (class 1); Holland, Denmark and Luxembourg are equally homogeneous to each other and to their bordering regions. France, although more diversified compared with Germany, also has a relatively good level of social-economic structure: if we exclude Languedoc-Rossillon, all the regions of France belong to medium-high classes.

## 3. Structural analysis of agriculture

### 3.1. Methodology and variables used

The methodology adopted for regional analysis which is now well-consolidated in economic-agricultural research revolves around the integration and the successive use of factor analysis (method of principal components), and regression. At the beginning, the principal components were extracted from a set of structural variables.[8] Then, the very same factors were used as explanatory variables in a model of regression designed to provide information about the determinants of the performance.

The comparison between observed and estimated results finally provides a picture of each region to be contrasted with its own very theoretical potentiality.

The choice of the explanatory variables was strongly conditioned by the availability of statistical sources. A list of the 21 variables under examination is shown in Table 3.[9]

The variables indicated as instrumental were used in the factor analysis to point out the latent factors of a structural type. The other variables, indicated as dependent, were used instead to interpret, in simple models of regression, the performance of agriculture in the Community.

### 3.2. The matrix of correlation coefficients

Table 4 summarizes the matrix of correlation coefficients by indicating with + or - the sign of the relationship obtained and with asterixes the degree of statistical significance of the link between variables. The results obtained allow us on the one hand to confirm many theoretical predictions.

Firstly, it is possible to affirm the existence of an inverse correlation between the degree of economic development (Index) and the importance of agriculture expressed in terms of employment (Agremp) which is strengthened when the farms are smaller (Smafrm) or managed by older people (Oldfrm), whereas it tends to weaken, ceteris paribus, in the presence of an agriculture with an intense consumption of energy (Energy), when the agriculture is more highly integrated (Incemp, Incuaa), and when it shows higher productivity (Faoemp, Faouaa).

The index of development is negatively correlated with the cultivation of vegetables and fruit and positively, although in a less significant way, with cereals, beef and pig breeding and wine produce.

The rate of agricultural employment is higher where crop production prevails, with the exception of cereals, and lower where livestock breeding prevails. The regions where land resources (Uaalan and Aralan) are relatively good tend to favour cereal production rather than that of fruit and vegetables, wine and milk. Livestock breeding, especially of cattle, correlated negatively with all the forms of cultivation, is mostly present where the farms are of a larger size or run by younger farmers. Pig breeding is positively correlated with an intensive use of energy.

The small farms, which are those that are managed mostly by older entrepreneurs are more energy-saving, and more widespread in the most disadvantaged areas in terms of agricultural resources, of availability of human resources and of general economic development. These enterprises favour the production of fruit and vegetables, wine-growing and poultry breeding rather than the production of cereals and all other types of farming. Therefore, such results reveal that in the EEC there is a strong link between modern agriculture and general economic development and, conversely, a contrast between agricultures with major structural problems and lagging economies. What may be deduced from the variables analyzed is that structural problems of agriculture emerge in areas of production that are fundamentally labour-intensive, where the farms are smaller and where less up-to-date techniques concentrate on the production of goods which do not include cereals.

## 3.3 The identification of structural determinants

On the basis of the above-defined variables, an attempt was made to trace the structural determinants of many regional agricultures by applying at first factor analysis.[10]

The methodology, according to commonly used statistical criteria[11], yielded five principal components, which together explain a great share (76%) of the total variance of the selected variables. The principal reason for passing from original variables to factors lies in the possibility of attributing to the latter a role of proxy of qualitative variables superior to the original ones.[12] The theoretical value of the application of the methodology lies in the identification of these variables and in the possibility of giving them a name, having some correlation with the original variable.

Tab 5 shows the coefficients of correlation between the original variables and the factors, which constitute the fundamental basis for the deduction of the economic meaning of the latter.[13] To facilitate the interpretation of the results, figures 2 to 6 show the 15 regions with the highest and the lowest factor scores for each of the principal components extracted.

Factor 1: 'Extensive Agriculture'. This principal component explains more than a quarter of the total variability. It defines an agriculture characterized by the strong presence of crop production (a strong positive correlation with cereals and other cultivation and highly negative correlations with animal production and milk). The good quality of natural resources combined with the relevant sizes of the companies and the use of energy (for tractors), suggest labour-saving and capital-intensive methods of cultivation. The regions with the highest factor scores appear to be situated above all in central-eastern France, in some regions of the United Kingdom, in Spain, Italy and in Denmark. Factor 1 could even be described as an agriculture which practices crop production, with strong emphasis on cereal cultivation and farming practices with a low intensity of labour. To describe these features the term 'Extensive Agriculture' has been used.

Factor 2: 'Mediterranean Agriculture'. This factor accounts for a fifth of the total variance. Fundamental features are the small farm sizes, associated with typically mediterranean products (fruit, vegetable and grape-growing), a negative correlation with cattle breeding and with the utilised agricultural area, and a positive one, even if insignificantly, with labour. The regions with higher factor scores (see fig. 3) are typically mediterranean. To describe these features, the term 'Intensive Agriculture' has been used.

Factor 3: 'Modern Agriculture'. The third component is characterized by reduced agricultural employment, lower intensity of regional problems (of which the lowest values express worse situations) high degree of mechanization and high presence of young entrepreneurs and large companies. This may signal an agriculture characterized by capital intensive technologies and situated in a favourable social-economic environment: other than the above-mentioned positive correlation with the intensity index, the fact that the farms are run mainly by young entrepeneurs and are on average of large dimensions is relevant. As far as productive specialization is concerned, the modest values of the coefficients of correlation do not allow us to make any conclusive judgements; however it seems that cereal products are dominant together with pig and cattle breeding. The regions with the worst factor scores are located in Southern Italy. On the other hand, the highest scores are found principally in the central areas of the Community. The third component can therefore be considered typical of 'agriculture characterized by capital-intensive processes of production, having generally efficient, productive structures and situated in a positive social-economic context'. It has been called 'modern agriculture'.

Factor 4: 'Industrial Agriculture'. Poultry and pig breeding, using advanced technology and systems similar to the industrial ones are the main features of the fourth factor. These sectors have a high capability of responding to changes in the economic profitability of production: land, the most difficult factor to adjust to changes in output prices, is not an important input, hence productivity may play a decisive role in the shift of market shares. For these reasons, poultry and pig production are particularly sensitive to technological changes, price policies and the availability of imported foods for feeding. These have considerably changed the relative advantages of the different regions, favouring the countries with strong monetary systems situated near to well-equipped ports and those which 'crowd out' the competitors within the EEC.[14] The example of regional groups shown on fig. 5 confirms what has already been said, that is, the 'strong' regions of northern Europe (among these also Lombardy) together with three coastal regions of Spain that show the highest factor scores.[15] The fourth factor may be termed 'agriculture specialized in livestock production, typically poultry and pig breeding, obtained with the use of high technology and with scarce use of land'. In concise terms 'Industrial Agriculture'.

Factor 5: 'Mixed Agriculture'. The final factor explains only a small part of the total variability (7%) and it is less immediately identifiable. Nevertheless, since the majority of the regions characterized by this component are situated in the central-eastern part of Italy, the factor has been identified with reference to the peculiarity of the 'diffuse development' of these regions: because of the vast presence of small industrial and artisan enterprises, which have continued to keep a close relationship with the countryside.[16] The fifth factor is positively correlated with the index of ageing, reduced farm sizes and low levels of mechanisation in productive systems. These features may be considered a legacy of the process of firms' structural adjustment which took place mainly in central Italy in the 70s and whose typical feature is the so-called 'production de-centralization' towards peripheral areas. The process was favoured by the possibility of exploiting relatively cheap labour in a more favourable social environment, due to the links

that the labour force had with the farming sector which could offer an additional source of income with a relatively low input of labour (mainly in the form of seasonal work). The strong correlation with poultry production can instead be considered as a sign of the presence of production methods which are typical of a more developed agricultural sector (i.e: industrial agriculture). The fifth principal component can therefore be called 'agriculture of the zones characterized by the development of alternative economic activities (both extra-agricultural and livestock without land), where forms of traditional agriculture co-exist with more advanced productive processes (poultry production). In more concise terms: 'mixed agriculture'.

## 3.4. *Economic and Statistical Outcome of the analysis of determinants of the results of European agriculture*

The principal components obtained from the application of factor analysis were used as explanatory variables in some regression functions to try to interpret the results of agriculture in the EEC.[17] Two of the identified functions: Fao/Empl and Fao/Uaa, were then used to verify, through the comparison between observed and estimated values, to what extent structural differences contributed to the determination of regional economic performances.

Before analysing the results it is worth mentioning that all the variables are standardized [18] and so the identified parametres in the relationships are all comparable with each other.

The first observation, of a statistical nature, is the improved quality of results obtained from equations expressed in terms of employed persons compared with those measured in terms of utilized agricultural area. Obviously on a European level the first unit of measure (employment) is more homogeneous than the second (Uaa). Secondly, the equations which measure inputs - those which interpret more closely the decisional process of the producers - are from a statistical point of view, better than those that attempt to interpret production, since the latter is always influenced by biological and climatic factors which can be controlled only imperfectly if at all. Evidently, also on a community level, the influence of the most difficult variable for agricultural producers to control is significant for the results obtained. Considering each individual equation singly, the result obtained in equation 1 is very interesting: as expected the yields per hectare are significantly affected by the type of production process applied. In particular Industrial agriculture, Modern agriculture and Mediterranean agriculture produce, in that order, the highest yields: Mediterranean agriculture is expressed by a negative differential whereas Mixed agriculture by an insignificant parameter.

Looking at the yield measured by final agricultural output (equation 1) and that measured by added value (equation 2) the structure of the function is strongly modified and the statistical quality is reduced. Extensive agriculture accentuates its inverse link, Mediterranean agriculture accentuates its direct link, Modern and Industrial agriculture strongly reduce their direct links (the last factor even loses its statistical significance); finally, Mixed agriculture although remaining in a statistically weak area, shifts to the category characterized by direct links. Equations 3, 4, 5 and 15 provide an interpretation of the modifications mentioned: Modern and Industrial agriculture are heavy users of raw materials (energy in particular) while Mixed and Extensive agriculture are savers: Mediterranean agriculture would be intensive from an energy point of view and neutral as regards other raw materials.[19] The sign of numerous parameters changes when we pass to equations measured in terms of employed persons (equations 6 to 10). In particular, the output per person employed is much higher in the regions where the systems of Modern agriculture, Extensive agriculture and Industrial agriculture are

present, and not as high in the areas of Mediterranean and Mixed agriculture. In terms of income, high levels of output per employed person do not necessarily imply high levels of added value (no. 7). Once again, the interpretative key for these results is to be sought in the different correlation between the four resources considered (land, labour, energy and other raw materials) which, in the various regions, are combined in a diversified manner (relations 8-11 and 15).

Very consistent positive links characterize Extensive, Modern and Industrial agriculture where raw materials (energy and other) are intensively used; on the contrary, persons employed in Mediterranean and Mixed agriculture use relatively lower quantities of raw materials.

From equations 12-15 it is finally possible to verify the capacity of various agricultural systems to transform raw materials into income: positive differentials characterize only the area of Mediterranean agriculture; the capacities of Modern and Industrial agriculture is surely negative and the positions of Extensive and Mixed agriculture is doubtful.

The areas of Modern agriculture reach the best positive income results of the EEC because of the high yields obtained, the discrete availability of land per person employed and because of the relatively reduced use of raw materials (non-energy in particular). The latter however do not find the best exploitation in this type of agriculture seeing as the return in terms of added value is lower than the EEC average.

The areas of Extensive agriculture are characterized by more contained yields per hectare and by productive processes that tend to contain energy use. The minor relevance of the constraint exerted by farm size allows this type of agriculture to achieve high volumes of supply and income per working unit: in this type of agriculture the returns in terms of income of raw materials is probably below average.

Industrial agriculture shows the highest yields per hectare linked to the extensive use of variable resources (non-energy materials in particular). This characteristic, combined with the limited availability of agricultural land, tends to reduce incomes below the European average. In these areas, where the use of raw materials does not seem to be particularly fruitful in terms of income, the relatively more important substitutability is determined between land on one side and raw materials on the other. Mediterranean agriculture reaches incomes which are slightly above average because of high yields per hectare and the reduced use of raw materials including energy. The farmers'incomes are affected in a decisive way by the availability of land. Compared to other types of agriculture labour here tends to substitute raw materials which would be characterized by better returns in income terms.

Mixed agriculture, less easily characterized both in economic and statistical terms, obtains the most relevant savings in energy consumption (the position of other raw materials is not so sure) and it is through raw materials that it can partially recover income. In comparison with Mediterranean agriculture the restraint imposed by the availability of land is not as tight and the substitutability of labour is more relevant with respect to energy resource rather than to other materials.[20]

The picture that emerges from this type of analysis is, in conclusion, particularly interesting: in some regions of Europe, where intensive and mixed agricultural systems prevail, the volumes of output per head (and so unitary incomes) are much lower. The reason for this result can be found in the limited availability of land per head and, in regions where mixed farming systems prevail, even in the limited yield per hectare.

Modern and Extensive agriculture do not present particular problems: the positive results are due to in the first case both to the high productivity per hectare

and the considerable availability of land per head, in the second to the considerable availability of land per employed person.

The mediocre performance of Industrial agriculture is probably due to the limited availability of agricultural area per head, which imposes on the enterprises a relatively high inefficient use of raw materials.

## 3.5. Efficiency of regional agricultural systems

### 3.5.1. Absolute efficiency

The analytical view presented up to now allows us to compare the efficiency of regional agriculture within the Community. The results now shown constitute a preliminary approach to the problem that deserves further investigation, and are presented in conclusion to indicate a direction of analysis which in the course of the research appeared to be quite interesting.

The objective was that of supplying a classification of community regions and a cartographical representation of the average productivity of labour (Y/L) and of land (Y/T). As is well known, the two ratios are linked by a connection of this type: Y/L = (Y/T) * (T/L).

On fig. 7 a representation of what could be called absolute efficiency of agriculture in the EEC is given. Regions are first of all classified into two categories: 'rich and poor' on the basis of the assumed value of the ratio Y/L compared to that of the Community average. Each category is subsequently divided into 3 groups in terms of the assumed values of the two factors Y/T and T/L.

The total picture outlined seems quite interesting. In particular, the north-south dualism appears to be less clear-cut: it most certainly indicates a vast presence of low levels of labour productivity in all southern countries due to either low productivity of land (most of all in Spain and the South of France) or to excess employment (the centre-south of Italy and Greece), but this latter phenomenon does appear in South Germany as well. On the contrary, North Europe generally shows Y/L ratios above the EEC average. These are explained by the prevalence of Y/T in the north of Germany, Belgium and Holland, of T/L in Ireland, Scotland, Wales and in the central regions of France and by the positive contribution of both factors in England, Denmark and Northern France. But also two significant areas of southern Europe show these performances: the mediterranean regions of France and the Italian regions of the Po Valley.

The latter, therefore, if in their structural features show, as already seen, characteristics typical of southern European agriculture, then in the absolute results they achieve objectives which are generally found in north European agriculture.[21]

It can be shown that in 33 regions the availability of land causes problems for the development of local agricultural systems (18 of which are Italian). Of these regions, 11 (4 Italian) emerge in terms of production per employed person because of the high yields per hectare which are probably due to the better quality of natural resources.

### 3.5.2. Relative efficiency

The concept of efficiency utilised up to now, is of an absolute type: the comparison of regional ratios Y/L, Y/T and L/T with the respective European averages, does not take into account any specific factors present in the European regions: like the structural ones considered in this research.

The following analysis tries to compare the results observed and the theoretical (fitted) ones taken from the functions estimated with the regression method.[22] When the differences between observed and fitted values depend on the cumulative effect of all the variables not explicitly considered, including statistical errors, the operation that consists of attributing them the task of measuring the relative efficiency is a simplification that could prove excessive.[23]

Nevertheless, fully aware of the possible limits, the results obtained can prove useful for further verification. As can be seen at a glance, fig. 8 shows results that are not always convergent with those shown on fig. 7, as was expected, but some confirmations are significant. The most relevant aspects that emerge from a comparison of the two maps can be summarized as follows:

1. Agricultures that show the best results, compared to those theoretically attainable with the respective structural endowments represented by factors, do not always coincide with those types of agriculture where the results are above average, and viceversa.

2. In particular, the analysis shows the presence of three areas in Europe in which there could be possible significant improvements in efficiency: Spain, southern France (excluding the mediterranean coast) and Germany. In these areas the intervention of agricultural policy could therefore aim not only at improving the supply of resources, but also at re-organizing their exploitation.

3. Italy presents a striking and important case because there are large inter-regional differences of performance - the classic prescription for a regional problem. The map of agricultural efficiency is highly diversified, with excellent performances in a large part of the northern area. The satisfactory performances of many southern regions (fig. 8) appear less obvious because despite a limited supply of natural resources and basic climatic difficulties economic results emerge which, although below EEC average, are however above theoretical expectations. This result, if it were confirmed in other analyses, would be particularly interesting as it would indicate to those responsible for agricultural policy the presence in Italian agricultures, also in the less developed ones, of comparatively good capacities for the utilisation of resources. Structural handicaps such as inadequate size and fragmentation of companies, excessive agricultural population coupled with drought and unreliable rainfall are the main reasons responsible for the poor performance of southern regions. Nevertheless, an agricultural policy aimed at the re-allocation of resources could achieve a good deal, even if it cannot by itself overcome the basic biological and climatic difficulties.

## 4. Conclusions

The main aim of this research paper was not so much to provide conclusive judgements, but rather to give a preliminary picture of how, passing from national to regional dimensions, information is enriched and the analysis is usefully strenghtened. The heterogenity of agriculture that characterizes the real object of study is particularly noted both between individual countries and within their own boundaries: this is the case of Italy.

As has been attempted to demonstrate, hosts of structural factors make regional affinities and differences emerge that would permit the re-drawing of the European agricultural map on the basis of territorial aggregations that often cross national borders. Therefore, within single states regional areas appear that are clearly differentiated and so, presumably have different demands for agricultural policies, which would deserve to be individualized and perhaps even distinctly represented.

The results of the analysis described above have outlined, as expected, a map of the agricultural development characterized by disparities which, in general, increase as one passes from north to south of the Community, but there is no lack of examples of southern regions that are more similar to typologies characteristic of the north (as in the Po Valley) or viceversa (as in the south of Germany).

These conclusions encourage a follow up study of the research in two possible directions.

A first direction could be the collection of the dynamic aspects of the behaviour of agricultures and their role in the context of regional economies. In this research paper it was not possible to advance in this direction because of the limited time series dimension of the statistical sources, but it is hoped that improved co-ordination and the development of more sophisticated retrieval and geographic information systems will improve accessibility and usefulness of the existing data sources, thus increasing comparability and availability on smaller than national geographical scales.

The second direction would be to try to verify the distribution and the impact of common, national and regional policies on a local level.

But other, even more consistent reasons suggest continuing in the direction already taken: these are connected to the view that the super-national dimension is a new field of investigation for the question of European agriculture together with the regional dimension which constitutes the principal institutional reference point of agricultural policy not only in Italy (art.117 Const.), but also in Europe - as recent experience teaches (MIP, reform of the structural funds, Mc Sharry reform, etc...).

The choice of gradually bringing to this level the axis of agricultural policies is a political question and it is part of the wider question of the relationship between the two contemporary requirements of union and autonomy: Europe of the Regions. The analysis of reasons for the choice goes beyond the tasks of this work, but as the research has allowed us to verify, it opens up a vast series of methodological problems and requires the construction of the basis for a more articulated knowledge of the characteristics of the regions of the Community and the relationships that link one to the other.

[1] Research carried out within the Action Concertée: la PAC et les régions: construction d'un dispositif pluridisciplinaire pour l'analyse de l'espace agricole communautaire.

[2] It is for example possible to affirm that the structures and agricultural interests of some regions of the Po area are more similar to those of Holland or of other areas with a high level of agricultural development, than those of the south of Italy.

[3] Table 1 shows the three NUTS (Nomenclature of Territorial Units for Statistics) levels on the basis of which the area of the Community was classified following an agreement between the EC Statistical Office (EUROSTAT) and member states. This nomenclature represents the basis for the identification of the regions eligible for the Community financial aid: 'lagging regions', 'declining industrial areas' and 'rural areas'. Eurostat (1990).

[4] For the GDR it was decided not to take into consideration three regions 1 which are the city states of Berlin, Hamburg and Bremen, because of their limited relevance from an agricultural point of view.

[5] The so-called 'Intensity index of regional problems' was calculated by the Commission in the 'Third periodic report on the social and economic situation and development of the regions of the Community': European Community Commission (1987). Practically, the higher is the level of development and the more favourable is the economic perspective of the region, equally as high is the index. With reference to 1985, it provides a synthesis of the economic situation and occupational potential by examining the following variables: GDP per head, GDP per person employed, unemployment rate adjusted to take into account agricultural underemployment, estimation of supplementary employment due to the increase of work force by 1990.

[6] Commission of the European Community (1987):

[7] Commission of the European Community (1987).

[8] The analysis of the principal components allows representation of a determinate series of observed variables by means of a relatively limited number of latent factors (principal components) each one independent of the other, which synthesize the information supplied by the original series of data, even if with a relative loss of information. As far as the statistical synthesis is concerned, the capacities of the method are conditioned by the presence among sub-groups of original variables of high levels of correlation: the principal components aim at realizing a 'descriptive economy', by synthesizing such highly correlated variables and explaining in few factors the maximum proportion of total variation. The economic validity of the application is instead conditioned by the possibility of associating an economic meaning (a 'name') to the extracted factors, individualizing the latent variables they represent.

[9] Most variables refer to 1987 values. When possible biennial means (1986-87) were calculated.

[10] The case of proceeding with the application of factor analysis was tested beforehand. The results of such tests were quite satisfactory: in particular, Bartlett's sphericity test allowed a 99.9% proof rejection of the hypothesis of orthogonality among the original variables, whereas the KMO index (Kaiser - Meyer - Olkin: sampling adequacy) was equal to 0.61: a value between 0.60 - 0.70 indicates relatively satisfactory applicability of the procedure.

[11] Only factors characterized by eigenvalues=1 were considered.

[12] 'Entrepreneurship' for example is most certainly a variable which influences the performance of agriculture, but being a qualitative character it cannot be measured. In this case variables of inferior order but quantifiable are generally resorted to and it is assumed they are highly correlated to entrepreneurship; for instance: the training skills of farmers, their age, the intensity of use of capital or specific techniques etc... With factor analysis the opposite procedure is carried out: if the variables now being described are included in a factor analysis, a strong factor correlated to them is obtained and it is assumed that this could be the variable of superior order: 'entrepreneurship'.

[13] Given that the objective of factor analysis is that of identifying factors which are substantially significant (that goes to say that they are able to summarise groups of highly correlated variables) the matrix of the correlation coefficients was rotated (varimax method) to transform the initial matrix into one which could be more easily interpretated.

[14] Cfr. F.Brioschi - F. Lechi (1985).

[15] It concerns a traditional region, Catalonia, and the more recently developed regions of Galicia and Murcia, which seem to copy, even if with particular features, the process of agricultural and structural dualism which characterizes Italy. However, this suggestion is merely a hypothesis to be subject to further verification, mainly with regards to the recent entry of Spain into the EEC, which does not allow us therefore to make use of consolidated research and regional analytical data.

[16] Among the authors that have studied such a model, with reference to agricultural issues, see for example, Orlando G. (1981).

[17] Among the estimated functions there are some in which the dependent variable has already been used as an instrument in the individualization of factors. In such circumstances the procedure followed cannnot be considered totally correct. It was preferred though to neglect this aspect because, although it is evident that the contribution to each factor of a single variable is particularly limited, if we show all the regression functions this allows a better comprehension of the internal relationships linking European agriculture.

[18] Since every observation, i.e. the data of each region, is measured in terms of the deviation from the community average related to the standard deviation of the original values, the estimated slope coefficients are directly the values of the elasticity of the dependent variable with respect to the single factor. It should be kept in mind that the perfect orthogonality of the principal components implies that, when they are used as explanatory variables, the estimated values of the slope coefficients do not change if single factors are added or taken away from regression functions.

[19] The terms used here generally refer to technical progress, following the classification proposed by Hicks. In this context when it is affirmed that a type of agriculture is 'intensive' (or extensive) in a certain resource, it is simply meant that it uses the same resource in a relative major (minor) quantity to that of the EEC average.

[20] The presence of employment alternatives outside the primary sector should increase the cost of labour and hence its productivity but, in a context of diffuse industrialization, farmers may well take into account these employment opportunities while remaining in the agricultural sector. In this case, the most likely outcome is a badly run and therefore less productive agriculture.

[21] Conversely it can be said, on the basis of the results obtained, that the south of Germany presents structures that are typical of the north of Europe but does not show valid results as does the agriculture of southern Italy.

[22] At this stage, each regional agriculture will be evaluated on the basis of its theoretical capacity to activate more or less efficient productive processes given its own resources and irrespective of the fact that the results attained are good or not compared to the Community average.

[23] The limits would have been partly removed if it had been possible to proceed with the estimate of the ratios observed/fitted for distinct time periods. If we assume structural constancy over time, the trend of the ratio for single regions provides useful supplementary information.