INDEX OF CONVERGENCE FOR AGRICULTURE OF EUROPEAN UNION

INDEX KONVERGENCE PRO ZEMĚDĚLSTVÍ EVROPSKÉ UNIE

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Abstract:

This paper explores the question of convergence in agriculture across the fifteen member states of European Union with the aid of an index of convergence for the period 1993-2001. Based on the results Netherlands maintains its big positive differences, Belgium, the United Kingdom, France, Sweden, Spain and Greece shows convergence, Denmark, Germany, Ireland, Finland and Portugal can be described with slight divergence. In case of Luxembourg both tendencies can be identified, Italy and Austria fluctuate about the average.

Keywords:

convergence, divergence, EU, agriculture, growing rate,

Anotace:

Tento příspěvek zkoumá otázku konvergence v zemědělství napříč patnácti členskými státy Evropské unie s pomocí indexu konvergence pro období 1993 – 2001. Na základě výsledků si Nizozemí zachovává své velké pozitivní odlišnosti, Belgie, UK, Francie, Švédsko, Španělsko a Řecko vykazují konvergenci, Dánsko, Německo, Irsko, Finsko a Portugalsko lehkou divergenci. V případě Lucemburska byly zjištěny obě tendence, Itálie a Rakousko se pohybují kolem průměru.

Klíčová slova:

konvergence, EU, zemědělství, rostoucí míra

INTRODUCTION

The number of the member states of the European Union increased to twenty-five on 1. May, 2004. Of course the continuous enlarging causes more and more differences in development between the countries. At the beginning six countries belonged to the EU with similar level of economical development, but today twenty-five member states can be found in it with considerable gap between the countries. So it is important to examine, if it can be expected that the differences across countries will be equalize or not. This can be interesting from the point of view that the recent tendencies and relations of EU-15 concerns to the enlarged EU. In further detail the text is going to examine the convergence of agricultural sector.

MATERIAL

The database of analysis is based on EUROSTAT data. In 2002 was published the Agricultural Statistical Yearbook (1992-2001)[1], which includes all the agricultural data of EU

[1] The data for the first year of the period cannot be used, because they are not available for Greece, and the average calculated without them – which is the base of the standardizing – would be difficult

member states (EU-15). The data of the agricultural area was published in the "Czech, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian and Slovenian Agriculture in comparison with the EU countries" by IERiGZ Institute of Agricultural and Food Economics (Poland) in 2003.

OBJECTIVES AND METHODS

The paper will examine the convergence of agriculture across EU countries with a convergence index created by an author, which includes seven indicators. The selection of appropriate indicators is based on the correlation matrix of average data of EU in a way that the index describes all dimensions of agriculture and the information are not presented two times. So were explored

- crop output per ha and animal output per ha, which show the volume of output
- crop output and animal output proportion to the total output, which show the structure of agricultural sector
- agricultural area per agricultural workers, as the indicator of efficiency
- agricultural GDP per agricultural workers, as specific indicator of effectiveness
- the reciprocal of fertilizer consumption per ha, which shows the measure of environmental lasting.

These indicators are taken into account at the calculation of index.

The index was calculated in three ways. At the first variant all the indicators have the same weight. At the second variant the weights are computed after the correlation matrix. The weights are based on the sum of the coefficient of correlation. Indicators with higher coefficient of correlation have smaller weight and reverse. Their sum must be one. At the third variant the results of the cluster analysis serves as the basis of the weights. The variables are divided into two groups by the cluster analysis. The proportion of plant and animal output belong to the first group, and the others to the second group. The two factor (group) are taken into account with the equal weight (50-50 percentages), and equal weights are within the groups. Table 1 represents the applied weights at the three variants.

Table 1

The applied weights at the three variations

Indicators	Equal weights	Correlation weights	Cluster weights
Animal output per ha	0.143	0.197	0.25
Crop output per ha	0.143	0.119	0.25
The proportion of animal output	0.143	0.141	0.10
The proportion of crop output	0.143	0.158	0.10
Agricultural area per agricultural workers	0.143	0.155	0.10
Agricultural GDP per agricultural workers	0.143	0.112	0.10
Reciprocal of fertilizer uses per ha	0.143	0.118	0.10

Source: Own calculation based on EUROSTAT.

RESULTS

The results of the three variations are evaluated by development gradiations, growing rates and figures. The tendency of convergence or divergence can be shown with the gap between the countries and the community average. The countries either enlarge this gap (divergence) or reduce it (convergence).

All the results show, that the **gradiation** of member states has not been changed significantly in the period 1993-2001. In case of the **first variant** the performance of

agriculture of Netherlands is the best, Belgium stand on the second place and Denmark on the third one. On the fourth, fifth, and sixth position Germany, France and the United Kingdom are in rotation, but while Germany and France show positive tendencies, the situation of the United Kingdom is getting worse in the examined period. Sweden and Luxembourg change each other on the seventh and eight places, the ninth, tenth, and eleventh positions belong to Spain, Greece and Italy. Then follows Austria and after that Finland and Ireland by turns. And in the end there is Portugal. The **second variant** only in several cases differs from the first one. This takes places mainly in case of countries rotating however, because their performance are very close to each other, so the small deviation between the member states resulted by different weights leads to gradiation-changes. At the **third variant** the first three countries equal to the first one, because they have remarkable advantages concerning their agricultural performance. The fourth – in almost all case – is Germany, then come France and the United Kingdom by turns. Furthermore changes can be noticed compared to the preceding, because Italy and Luxembourg follow, then Sweden, Spain, Greece and Austria, and finally Finland, Ireland and Portugal. It seems the cluster weights prefer – in a small measure – Mediterranean countries to the others.

Table 2 represents the priority occurred by the **averaging of the gradiations** in different years.

Table 2

Development gradiations of the countries at the three variants

Gradiation	Equal weights	Correlation weights	Cluster weights
1.	Netherlands	Netherlands	Netherlands
2.	Belgium	Belgium	Belgium
3.	Denmark	Denmark	Denmark
4.	United Kingdom	United Kingdom	Germany
5.	France	France	France
6.	Germany	Germany	Italy
7.	Sweden	Spain	United Kingdom
8.	Luxembourg	Sweden	Luxembourg
9.	Spain	Italy and Luxembourg	Sweden
10.	Italy		Greece and Austria
11.	Austria	Greece	
12.	Greece	Austria	Spain
13.	Ireland	Ireland	Finland
14.	Finland	Finland	Ireland
15.	Portugal	Portugal	Portugal

Source: Own calculations based on EUROSTAT.

The gradiation is dissimilar on grounds of the growing rate (see Table 3). Germany is growing the most dynamically (in case of all the variants). The second and third are (far from Germany) Denmark and Greece and they replace each other at the third variant. They are followed by France, Luxembourg, Italy, whose growing rates exceed 1,5 percentages, then Netherlands, Ireland and Sweden, in whose cases the growing rate is about 1 percentage. The growing dynamics of the other members is less than one percentage, moreover, at the rate of the Austrian and Portuguese agriculture befalls the negative sign that means decline.

Table 3

Development rate of countries at the three variants

Me.: percentage

Member states	Equal weights	Correlation weights	Cluster weights
EU-15	1.40	1.41	1.88
Belgium	1.05	0.95	0.92
Denmark	3.03	2.86	2.80
Germany	6.15	5.64	4.22
Greece	2.03	2.01	3.32
Spain	0.15	0.33	1.17
France	1.87	1.74	1.97
Ireland	1.24	1.24	1.11
Italy	1.23	1.31	1.80
Luxembourg	1.62	1.53	1.32
Netherlands	1.38	1.03	1.44
Austria	0.47	0.29	- 0.01
Portugal	- 0.20	0.07	0.88
Finland	0.59	0.53	0.35
Sweden	0.91	0.91	1.12
United Kingdom	0.05	0.26	1.37

Source: Own calculations based on EUROSTAT

In respect of growing rate can be established that in case of eastern countries (Greece, Spain, Italy, and Portugal) favourable results are obtained by the cluster weights.

DISCUSSION

In order to facilitate and to make the **graphic analyses** perspicuous the countries are grouped by cluster analyses. The numbers of clusters are different. At the first and third variant the member states belong to four groups, but at the second one only to three groups. In the following the indices are plotted in clusters listed below. Table 4 presents the groups at the three variants.

Table 4

The groups getting by clusters analysis in three ways

Equal weights	Correlation weights	Cluster weights
Netherlands	Netherlands	Netherlands
Belgium Denmark	Belgium Denmark	Belgium
		Denmark
Ireland Finland Portugal	United Kingdom Germany France Sweden Luxemburg Portugal Italy Austria Spain Finland Ireland Greece	Greece Sweden Austria Spain Finland Portugal Ireland Germany Italy France United Kingdom Luxemburg
Germany United Kingdom France Italy Austria Greece Spain Sweden Luxembourg		

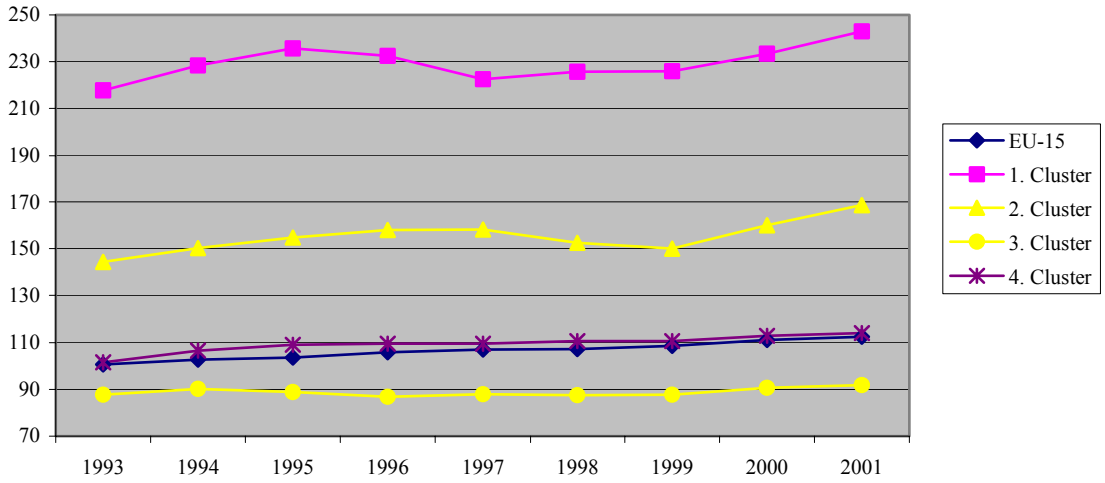
Source: Own calculations based on EUROSTAT.

Plotting the indices of the first variant (Figure 1) well stand out the spectacular advantage of the first placed Netherlands and the significant performance of Belgium and Denmark. Left

out of consideration the pervious three countries the member states can be divided into two cluster: a “near average” one (4. cluster), and an “under average” one (3. cluster).

Figure 1

Index of Convergence calculated with equal weights

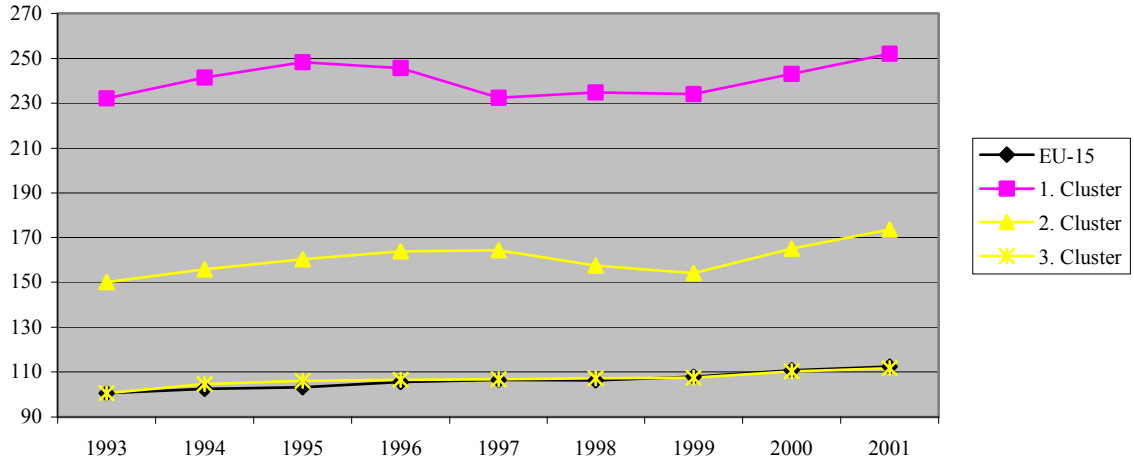


Source: Own calculations based on EUROSTAT.

If the correlation weights are applied the picture is similar but the previously defined “near average” and “under average” clusters compose the same group (4. Cluster), that is very close to the average, almost equal to it.

Figure 2

Index of Convergence calculated with correlation weights

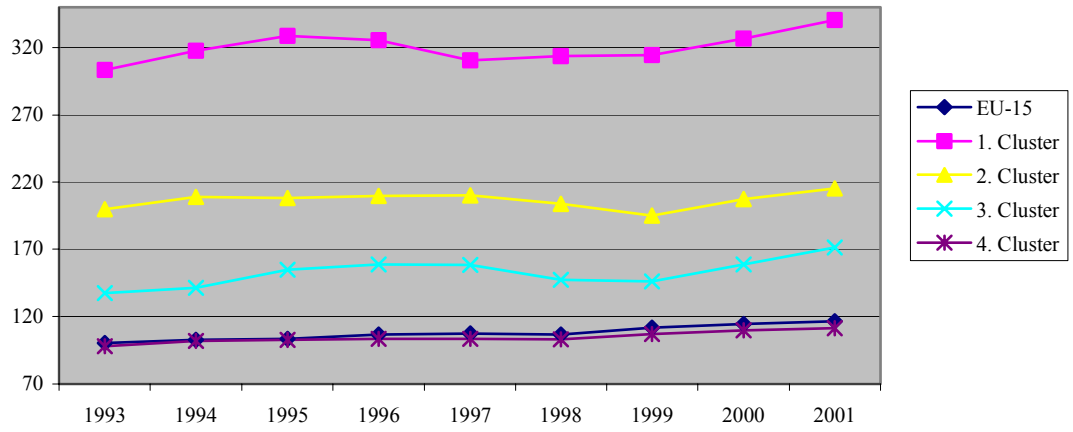


Source: Own calculations based on EUROSTAT.

In case of the third variant the grouping is in almost total accordance with the second variant: applying the cluster weights Belgium and Dania are got into two different groups. The others (4. Cluster) are almost equal with the average, which means that the 12 member states compose very homogenous group in aspect of agriculture.

Figure 3

Index of Convergence calculated with custer weights



Source: Own calculations based on EUROSTAT.

Regarding the question of convergence the members of EU show very dissimilar pattern. Among the three excellent countries Netherlands maintains its big positive differences. Belgium shows small convergence, Denmark can be described with slight divergence. The United Kingdom, France, Sweden and Spain (in various measures) converge from the top to the average. Germany can be described with small divergence above the average, while in case of Luxembourg both tendencies can be identified: converging one until 1996, and diverging one after 1996. Italy and Austria fluctuate about the average, Greece converges form the bottom, Ireland, Finland and Portugal can be identified with divergence under the average.

CONCLUSIONS

Summarise Denmark and Germany have the best position. Denmark puts up significant achievement and has auspicious future prospects after its growing rate, Germany don't have such a good situation, but due to its specially high growing rate it can become leader country. Netherlands and Belgium stably keep up their good position with low dynamic growing rate. The agricultural performance of the United Kingdom increases, but its rate is very low, so it is getting pushed into the background in the gradiations. In opposition the growing rate of France – its position is worst than the United Kingdom's – rises increasingly. Parallel relations can be observed between Spain and Italy. Spain has better agricultural position at present, but Italy shows more prosperous future perspectives based on growing rate. Sweden and Luxembourg deputize the average from both aspects. It the end of the priority sequentially follow Austria with especially low growing rate, then Greece, Ireland and Finland with short growing rate as well. Portugal has the worst situation; it not only has disadvantages at the agricultural achievements but also low growing rate.

After the selected method the results of the first and second variant are almost equal. Differences mainly in relation to the third type index can be found, but only if the differences are small. In these cases the cluster weights prefer the southern countries (Italy, Spain, Portugal, and Greece). In this member states the proportion of animal and plant output are high (together almost 100 percentages), so the other agricultural activities are insignificant. At the three variant the plant and animal output are taken into consideration with high weight, which causes better results of these southern countries.

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