CONCENTRATION OF AGRICULTURE AND COMPETITIVE ADVANTAGES OF EAST-EUROPEAN COUNTRIES

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ABSTRACT One of the main problems facing all countries at the European agri-food market is achieving agricultural specialization. Such specialization can bring additional advantages with regard to differentiation in the markets. In this paper we seek to identify the sources of competitive advantages of agriculture in Central and East-European countries. The primary purpose of our research is to identify newly emerging patterns of regional specialization within and across these nations, and to examine their effects on agricultural productivity, regional competitive advantages and international trade patterns. We draw on various public data sources to analyze the patterns of geographic concentration.

To determine the level of the concentration we use the following group of indicators of regional specialization and geographic concentration: Herfindahl index, the dissimilarity indexes of specialization and concentration, Krugman specialization and dissimilarity indexes, and GINI coefficient of regional specialization.

We expect that our results will be conducive to determination of the most efficient production patterns according to regional specifics and specialization.

Keywords: Regional specialization, Agriculture, Location of agriculture, East-European countries

1.   INTRODUCTION. Over the past decade, the Common Agricultural Policy (CAP) of the European Union has undergone a number of changes oriented towards adjustments to new market opportunities and challenges such as climate change, water management and bio-energy. In greater detail, these changes are encompassed by the so-called Health Check of the CAP reform process. In the context of aspirations to change some aspects of the CAP, the main proposal of the European Commission is to establish common rules for direct support schemes under the CAP.

At the same time, economies of some of the new EU countries (EU-10 and new EU-2) depend much on agricultural production and food processing. Furthermore, their main competitors at the European agri-food market are the EU-10, new EU-2 and Non-Member States (predominantly Post Soviet Countries).

Such circumstances raise several questions regarding future developments caused by possible adoption of the changes in trade conditions. First of all, what will be the outcome of the favored treatment of competing States for the European agri-food markets? Second, what is the role of concentration in agrifood performance? At last, does the countries or regions with higher level of agricultural production concentration and/or specialization can be more or less competitive than other once?

In order to answer these questions, the current study aims to analyze advantages, actual conditions and possible impact of policy changes on the agri-food development. The main underlying premise is that the business environment represents one of the most important drivers of competitiveness for domestic and export-oriented agri-food enterprises and industries.

An anticipated result is that Non-Member States can play an important role at the European markets, primarily due to long-term comparative advantages in production of unprocessed products (wheat, corn, sunflower seeds, rapeseeds, sunflower oil and rapeseed oil). To remain competitive, East-European countries will have to change partly their orientation at the agri-food market from commodities towards processing as well as to put more emphasis on export-orientation. Furthermore, the potential changes of tariffs and trade conditions (according to WTO negotiations and CAP policy) can recover the trade relationships between traditional partners – countries of Central and Eastern Europe. Finally, changes in the structure of trade can lead to formation of a new frame of agri-food markets in both, the EU and Non-Member States.

The World Trade Organization has the own quality and production process standards, which has to be implemented for all members. This is the easiest way for unification the production process and quality control for the all trade flows, and this is extremely important for agri-food products. The WTO accession for some of the Neighboring Countries (a.g. Egypt, Israel, Morocco and Tunisia in 1995, Georgia and Jordan in 2000, Moldova in 2001, Armenia in 2003 and, at least Ukraine in 2008) made some changes in internal political approaches accordingly to the requirements for new members (decreasing of the import taxes, level of state support and export subsidies cancellation). All these measures influenced to the trade structure and opportunities for Non-Member States. Most of them for now became to the group of net – importers for most of agri-food products, there are only some of them exporting the number of products (a.g. barley, wheat and maize).

The nowadays unwinding of the relationships between European Union and some of the other East European Countries concerning to the development terms of trade (including establishment of Free Trade Zones), entry facilitation and visa receiving for non-citizens, gives us an opportunity to suppose that in next few decades we will get the "hidden" enlargement. It can characterize by free movement of capital, labor and commodities, financial support of social development programs and infrastructural development within the European Development Program.

All of these countries has own Action Plan and support of European Union in social and economical aspects of development. But some of the EU countries, especially new members, have no any advantages compare with some of the Non-Membering Countries (table 1).

Table 1 – The main indexes of social and economic development

Country	GDP, mio.USD	HDI	GCI Rank/Score
EU-25	18,394,115	x	x
Bulgaria	51,989	0.834	76 / 4.03
Romania	199,673	0.825	68 / 4.10
Belarus	60,288	0.817	x
Moldova	6,124	0.719	95 / 3.75
Russian Federation	1,676,586	0.806	51 / 4.31
Ukraine	179,725	0.786	72 / 4.09

Source: www.wikipedia.com, The Global Competitiveness Report 2008-2009 © 2008 World Economic Forum,

The data from the Table 1 describes the small differences between some of the EU Members (EU-2) and some of the Neighboring Countries in reference to the general indexes of social and economic development.

2.   METHODOLOGY. Regional specialization and geographic concentration of industries can be generally defined in relation to production structures (Ricardo, 1817, Heckscher 1919; Ohlin 1933). Regional specialization refers to the distribution of the industry shares in total manufacturing in a specific region compared to a norm. A region is found to be specialized in a specific industry if this industry has a high share in the manufacturing of the region (Krugman, 1979, 1980, 1981; Helpman and Krugman, 1985; Krugman and Venables, 1990; Porter 2003). The manufacturing structure of a region is 'highly specialized' if a small number of industries have a large combined share in the total manufacturing. Geographic concentration is the measure of the distribution of regional shares in a specific industry. A specific industry can be considered as 'concentrated' if a large part of production is carried out in a small number of regions.

To analyze and compare agricultural specialization of the countries, we use the common methodologies of the main Indicators of regional specialization and geographic concentration of industries:

2.1.   Indicators of regional specialization and geographic concentration of industries – Herfindahl index. The Herfindahl index of regional specialization - This is an absolute measure of specialization often used in industrial economics. It sums up the squares of industry shares in the total activity in the region. It takes values between zero and one is positively related to regional specialization. Given the absolute nature of the Herfindahl index, the sum of the squares of shares is biased towards the larger regions.

Regional Specialization Measure

$$H_j^S = \sum_i (S_{ij}^s)^2 \tag{1}$$

As a measure of absolute concentration of activity in an industry i across regions j1…jm, the Herfindahl index of geographical concentration is calculated as the sum of the regions' shares in national employment in the particular industry: It is positively related with the geographical concentration of industries.

Geographical Concentration Measure

$$H_i^C = \sum_j (S_{ij}^c)^2 \tag{2}$$

2.2.   The dissimilarity indexes of specialization (DSR) and concentration (DCR) (Krugman, 1991; Aiginger et al., 1999; Devereux et al., 1999; Midlefart-Knarvik et al., 2000);

The main indexes we use in our research are Indicators of regional specialization and geographical concentration of industry (The indicators used in this paper to analyze regional specialization and concentration of industries are defined in a way that is similar to Aiginger, K. et al. (1999). The dissimilarity index is a modified version of the index proposed in Krugman (1991b)):

E = employment, s = shares, i = industry (sector, branch), j = region

S_{ij}^s = the share of employment in industry i in region j in the total employment of region j

S_{ij}^c = the share of employment in industry i in region j in the country employment of industry i

S_i = the share of country employment in industry i in total country employment

S_j = the share of the total employment in region j in country employment

$$S_{ij}^s = \frac{E_{ij}}{E_j} = \frac{E_{ij}}{\sum_i E_{ij}} \tag{3}$$

$$S_{ij}^c = \frac{E_{ij}}{E_i} = \frac{E_{ij}}{\sum_j E_{ij}} \tag{4}$$

3

$$S_i = \frac{E_i}{E} = \frac{\sum_j E_{ij}}{\sum_i \sum_j E_{ij}} \tag{5}$$

$$S_j = \frac{E_j}{E} = \frac{\sum_i E_{ij}}{\sum_i \sum_j E_{ij}} \tag{6}$$

The dissimilarity Index

Specialization measure (DSR$_j$)

$$SPEC_j = \sum_i |S_{ij}^s - S_i| \tag{7}$$

Concentration measure (DCR$_i$)

$$CONC_i = \sum_i |S_{ij}^c - S_j| \tag{8}$$

Regional specialization and geographical concentration of industries are defined in relation to production structures (Overviews of different measurements for specialization and geographic concentration of industries include Ellison and Glaeser (1997), Aiginger et al. (1999), Devereux et al. (1999) and Hallet (2000).). In absolute terms, a region *j* is 'specialized' in a specific industry *i* if this industry has a high share in the manufacturing activity of region *j*. The manufacturing structure of a region *j* is 'highly specialized', if a small number of industries have a large combined share in the total manufacturing of region *j*. In relative terms, regional specialization is defined as the distribution of the shares of an industry *i* in total manufacturing in a specific region *j* compared to a benchmark.

In absolute terms, a specific industry *i* is 'concentrated', if a large part of its production is carried out in a small number of regions. In relative terms, geographical concentration of industries is defined as the distribution of the shares of regions in a specific industry *i* compared to a benchmark. Several absolute and relative measures of specialization and concentration are proposed in the existing literature, each having certain advantages as well as shortcomings. For our analysis we have selected a relative measure (a dissimilarity index derived from the index proposed by Krugman, 1991a).

2.3. *Classical TCI, RCA (Balassa, 1965);*

Balassa's method of revealed comparative advantage indicates an 'ex-post competitiveness', i.e. the competitiveness is revealed in the export performance of the country. Therefore, the main policy recommendation from this kind of approach would be the development of the country's export potential in goods for which a high export specialisation is already achieved (Balassa, 1989). Balassa's method includes the following indicators: Revealed Comparative Advantage, Trade Coverage, Relative Revealed Comparative Export Index, Relative Import Penetration Index, and Relative Trade Advantage Index.

<u>*The Revealed Comparative Advantage*</u>

$$\text{RCA} = \left(\frac{Xin}{Xiw} \Big/ \frac{Xmn}{Xmw} \right) * 100 \tag{9}$$

Where Xin refers to the value of exports of commodity i from the country n, Xiw the value of exports of commodity i from all countries in the world, Xmn the value of exports of all goods m from the country n and Xmw value of exports of all goods from all countries. Values above 100 indicate a RCA and vice versa.

<u>*The Trade Coverage Index*</u>

$$TC_i = \frac{X_{ij}}{M_{ij}} \tag{10}$$

Where: X_{ij} is export of commodity (or group of products) i to the reference country; M_{ij} import of commodity (or group of commodities) i from the reference country; i is commodity group; j is the reference country.

In our research, we generally employ the methodological approach used by Traistaru and Iara (2002), Fischer (1998). The important comment for the understanding of the the empirical exercise: for concentration we use the distribution of production for all points in space, while for specialization we calculate average (over countries or regions) specialization in a country.

3. DATA.
The main reason is that the business environment represents one of the most important drivers of competitiveness for domestic and export-oriented agro-enterprises and agro-industries. An anticipated result is that Non-Member States can play an important role at the European markets, primarily due to long-term comparative advantages in production of unprocessed products (wheat, corn, sunflowers, rapeseeds, sunflower oil and rapeseed oil).

Data on regional average wages is used to calculate regional relative wages, which is the dependent variable in regressions estimating the impact of trade liberalization and the role of transport costs on the regional structure of wages. Data on GDP is used in the analysis of the relationship between regional specialization and growth. While the variables introduced so far are used for descriptive purposes or as dependent variables in econometric analysis, the following are used with the purpose of controlling for various demographic and economic characteristics of the regions in the econometric analyses: the distance between pairs of county capitals, numbers of domestic firms, number of firms with foreign participation, number of self-employed, density of national public roads, number of personal cars, number of students enrolled in higher education, number of telephone lines, population, public expenditure.

Most data is taken from regular publications of national statistical offices. Data that is not officially reported has been collected from other sources. In particular, among others, some countries' labor market data are from Labor Offices or similar institutions whereas firm level data has been partly collected from commercial registers. In the case of Slovenia, due to the lack of data from official sources, the data set is extended by data gathered from companies' balance sheets.

4. **RESEARCH.** We propose to observe the advantages of Non-Member Countries through the regional specialization and competitive advantages.

Accordingly to the Health Check Program for Common Agricultural Policy of the European Union development the attention in next 5 years will be pays to the cancellation of production limitation and creation the more competitive environment at the European agri-food market, simplifies and better targets direct support to farmers, responds to market opportunities and price crises by removing supply controls, and strengthens Rural Development policy to respond to new challenges[1].

For Non – Member States it can gives some opportunities in the field of market access and concerning to the Rural Development it can gives the chance to increase the quality of life in Neighboring Countries.

4.1. **GL index of Intra-Industry.** The size of intra-industry trade indicates the extent of the economic integration of one country. To this effect, we use in our analysis the Grubel-Lloyd index. Accordingly to the data from table 2, the economic integration in given countries are similar. The results for other countries can be explained by the structure of economic and geographical positions.

Table 2 – GL Index

	GL Index Value
Romania	23,8
Bulgaria	42,0
Russian Federation	61,0
Moldova	54,7
Belarus	48,2
Ukraine	46,5

4.2. **The dissimilarity indexes of specialization (DSR) and concentration (DCR).** The main indexes we use in our research are Indicators of regional specialization and geographical concentration of industry (The indicators used in this paper to analyze regional specialization and concentration of industries are defined in a way that is similar to Aiginger, K. et al. (1999). The dissimilarity index is a modified version of the index proposed in Krugman (1991b)):

Table 3 – The dissimilarity indexes of specialization (DSR) and concentration (DCR), 2000 - 2004

	DSR	DCR
Romania	0.263 (0.248)	0.0015 (0.0017)
Bulgaria	0.249 (0.279)	0.0003 (0.0275)
Russian Federation	0.368 (0.409)	-0.0012 (0.0075)
Moldova	0.982 (0.982)	0.0037 (0.0037)
Belarus	0.293 (0.166)	0.0092 (0.0014)
Ukraine	0.326 (0.288)	0.0062 (0.0035)

Regional specialization and geographical concentration of industries are defined in relation to production structures (Overviews of different measurements for specialization and geographic concentration of industries are given in, e.g., Ellison and Glaeser (1997), Aiginger et al. (1999), Devereux et al. (1999) and Hallet (2000).). Our research shows the important role of agriculture in economic development in all contributed countries. For some of them (such as Moldova, Romania and Ukraine) this is one of the most important branches. The manufacturing structure of all the regions is 'highly specialized' where a small number of industries have a large combined share in the total manufacturing.

4.3. **Classical TCI, RCA (Balassa, 1965).** Analysis of the Relative Revealed Comparative Export and Import Indexes provides the results for 3 groups of countries: World (regarding European trade with the World), EU-2, and Post-Soviet Countries.

Table 4 – XRCA Index

Commodity	WORLD	Post-Soviet	EU-2
Sugar	0,334	0,207	0,191
Cereal	7,591	9,103	8,262
Corn	4,894	7,629	6,688
Oil seeds	1,726	0,765	0,641
Technical seeds	3,861	4,426	3,007
Sunflower oil	39,835	101,190	45,810
Rapeseeds oil	1,1897	0,564	0,548

The results of the XRCA calculations (Table 4) indicate the relative advantages of the European cereal, corn, sunflower seeds and rapeseeds, sunflower and rapeseed oil at the world market. Comparatively to Post-Soviet the North-African loses its advantages in such items as sunflower seeds, rapeseeds and rapeseed oil. The reason for such changes is the high level of production of those products by some of the countries in the region. The same reason is for losses of

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[1] http://www.caphealthcheck.eu/

export advantages in sunflower seeds and rapeseeds relative to Romania. The XRCA indexes for Post-Soviet Countries are rather similar and indicate that the Ukrainian export of cereal products, corn, rapeseeds and sunflower seeds has comparative advantages.

The results of the Relative Revealed Comparative Import Index (Table 5) describes the different conditions of competitiveness for different types of commodities at the country and world level. Only sunflower seeds have disadvantage, other products have some opposite results.

Table 5 – MRCA Index

Commodity	WORLD	Post-Soviet	EU-2
Sugar	0,464	0,455	0,421
Cereal	0,019	0,027	0,026
Corn	0,637	0,956	0,906
Oil seeds	4,368	2,408	2,155
Technical seeds	0,484	0,494	0,479
Sunflower oil	0,049	0,036	0,034
Rapeseeds oil	0,006	0,004	0,003

The MRCA results obtained for North-African Countries indicate that wheat and oil (sunflower and rapeseeds) have disadvantages. The results for the EU-2 show disadvantages only in rapeseed oil, and for Post-Soviet Countries – only in sunflower seeds. We explain the results by the structure of the agri-food production (focus on plant production in the most efficient sectors) and proper attention of the government by the support programs. On the other side, the increasing demand for agri-food products at the world markets contributes to such results.

The TCI describes the position of Post-Soviet Countries relatively to the main countries – competitors at the European and World market (table 6). Ukraine shows the biggest value of export to the world market in technical and sunflower seeds export.

Table 6 – TCI Index

	WORLD	Post-Soviet	EU-2
Corn	3,42	125,42	6,27
Rapeseed oil	1,31	0,03	2,86
Sunflower oil	25,00	86,75	9,61
Sunflower seed	4,72	42,11	3,93
Cereal	15,70	88,38	52,95

Between the neighboring countries Ukraine is traditionally the main exporter of sunflower seeds and oil and cereal. Unfortunately, the level of meat production export is extremely low, and countries like Post-Soviet and North-African Countries has a high value in European import.

5.   DISCUSSION. We expect that our results will be conducive to determination of the most efficient production patterns according to regional specifics and specialization. During the last 10 years, the level of specialization in different countries has changed in different directions. The new members of the EU start to differentiate the structure of the economy. On the contrary, Ukraine, Moldova and Belarus change the structure of their economies not so fast and continue to consider agriculture as one of the main sectors. On one hand, this tendency is quite negative relative to the pace of development of the neighbouring countries. On the other hand, the agricultural specialization gives Ukraine the chance to become a big player in some segments of the world market (cereal, corn, rapeseeds, etc.) and use the actual tendencies in the world market for own development of agriculture and rural areas based on business opportunities (as opposed to the supported agriculture in Europe).

And accordingly to the regional specialization, peculiarity of location and climate, national and cultural specific features most of the countries has some interests at the European and World agri-food market. Nevertheless some of the new EU countries (EU-10 and new EU-2) as well depends on the agricultural production and food processing in their economic development. And the main competitors for them at the internal European agri-food market are the Neighboring countries which particularly exert efforts to find new opportunities at the EU agri-food markets.

Here we have to notice that there are two sides of the problem – from one side we've talk about importance of European market for Non-Member States, from another side – about the food security of the European Union accordingly to the new edition of the CAP - Health Check reform. The most important goal of the Non-Member States is to find the own place at the European agri-food market considering to the internal support for some new member states (s.a. Bulgaria, Romania and some of the EU-10).

The biodiversity program of the EU aimed on the conservation the species-rich vegetation types, protection and maintenance of grasslands which means no application of fertilizer and pesticides on high nature value agricultural land Integrated and organic production. So, in next decade we will observe the increasing of the popularization measures for organic production. For Non-Member States it is the reference to orient own agri-food production.

Respectively to the concentration of the agricultural production in the region we can also say that country specialization strongly depends on the level of development and economic integration. The example of some East European countries shows that involving into the whole-European market gives the chance for them to be less specialized in such cost and venture branch as agricultural production.

6. CONCLUSIONS.
Despite the use of different approaches to regional specialization of agriculture and competitive advantages of East-European countries, some of our results lead to similar conclusions. First of all, the Neighboring Non-Member States has its own commodities and market shares at the European and World markets and has very favorable conditions to improve its position. We have also obtained some positive trends in agricultural specialization of some of them relatively to its main competitors – neighboring countries. Our research also shows that as far as long-term trends in comparative advantage are concerned, some Countries (such as Bulgaria, Moldova, Romania, Russia, and Ukraine) will have a larger advantage in the production of unprocessed products (wheat, corn, sunflowers, rapeseeds, sunflower oil and rapeseed oil). Regional specialization of the agriculture heavily depends on the level of employment (in some States more than 30% of capable people employed in agriculture) and on the historical trends (in some economies agriculture is the main industry, but GDP is extremely low). The same tendencies we observe in the some of the analyzed EU-Member States (Romania and Bulgaria). Finally, for large countries with substantial differences in regional conditions, it would be useful to conduct the competitiveness analysis with regard to regions.

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