

## **MAIN DRIVERS OF CENTRAL AND EASTERN EUROPEAN COUNTRIES' AGRICULTURE IN 2005-2013: SPECIALIZATION AND LAND CONCENTRATION**

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**Abstract.** The paper deals with growth and productivity advantages of specialized farms by physical size in EU10 (Central and East European Countries, CEECs) and makes a comparison between EU10 and EU27/15 average using EUROSTAT data in the period of 2005-2013. Focus is given to exploring the level and development of such indicators as change in number of specialized farms, land (Utilized Agricultural Area, UAA) and labor (Agricultural Work Unit, AWU) use on input side; average farm size by land and labor use. On output side area, labor and total productivity were analyzed. Paper gives a dynamic analysis of all these indicators pointing out what farm sizes give a more stable ground for increasing growth and productivity at a higher speed supporting to improve competitiveness of CEECs' agriculture. It was concluded that specialization in farming in EU10 offered a more survival path having physical size bigger than non-specialized farms and, in relative term, pushed less labor out from the sector than non-specialized farms did. Specialized farms in EU10 have increased both labor and area productivity at a higher speed than non-specialized farms in all three productivity indicators except in Poland where it was opposite and, in Estonia in total farm output. Largest specialized farms more than doubled production in 7 out of EU10.

**Key words:** EU agriculture, specialization, farm size, productivity, CEECs.

**JEL code:** Q18

### **Introduction**

Concerning EU farm structure, significant changes have taken place in member states and it has been more so in EU10 since EU Eastward enlargement. Within the EU, however, the dynamics of development paths of agriculture in old (EU15) and new member states have been different by production structure, specialization and farm size. The paper gives focus on how much extent the advantages of specialization and economic of scale helping EU10 agriculture catching up over a decade after EU Eastward enlargement. Analysis of growth of farms of 10 specialization types and 5 farm categories by land size was made and, results were compared to EU27/15 average at country and farm category level.

### **1. Literature review**

Tangermann (1994) made even professionals surprised with his vision: „The structural changes ... going on in Central Europe's agriculture, both on farms and in upstream and downstream sectors, are shaking the foundations of decision-making and economic activities...” and added „Agricultural policy 'reforms' in western countries are nothing compared with the fundamental upheaval occurring in Central Europe...” (Tangermann, 1994, pp. 375- 392).

Forgacs (2002) pointed out agriculture output of CEECs declined by 20 up to 60 percentage in 1993-1994 compared to production level prior to radical reforms. In 2000 small (individual) farms cultivated 80 % or more of the land in Baltic states, Poland, Slovenia and Romania. On the other end around three quarter of land was in the use of large farms with a highest average of farm size in Slovakia (1360 ha), followed by Latvia (1135ha) Czech Republic (998 ha) and Hungary (960 ha).

The role, importance, development and policy aspects of small farms has always been in focus pointing out how the CAP tried to give help or, what weaknesses of CAP had in its policy to small farms (EP resolution, 2014; Davidova S,-Bailey A, 2014; Dwyer J, 2014; Davidova S, 2014). At the same time, it has been emphasized that small farms have to make changes in farming methods in order to have a successful adjustment concerning their possible integration into modern food chains (Csaki C, – Forgacs C, 2008; Gordon M. et al., 2014; Rabinowitz E, 2014). Social capital aspects of

small farms have also been investigated (Wolz A. et al., 2010). Structural change of Semi-Subsistence Farms (SSFs) in New Member States (NMSs) was discussed from agricultural policy point of view (Erjavec E. et al., 2014). The role and dynamics of small farms in rural development was analysed in a study focused on Romanian agriculture (Popescu D-L, 2014). Between 2005 and 2013 as many as 2.38 million farms (27.7 %) disappeared in EU10, 86.5 % of which had UAA below 5ha bringing deepening poverty in many rural areas. However, in general the specialization aspect of farms in the EU10 has not received much attention from researchers until more recently.

Forgacs (2016) found that, although, both area and labor productivity grew faster in non-specialized small farms, but growth in total productivity achieved by small specialized farms has exceeded that of non-specialized ones. Farm output of specialized farms (both small and non-small) have exceeded that of non-specialized farms both in 2005 and 2013 (Forgacs, 2017). Csaki C. – Jambor A. (2018) carried out a research on convergence of CEECs' and Countries of Independent States (CIS) between 1997-2000 and 2013-2016. Conclusions were rather different and not convincing concerning catching up of CEECs' agriculture, although, in some extent such convergence in EU agriculture was pointed out.

In Farm Structure Survey 2013 it was underlined „... across the EU-28 in 2013, smaller farms (in economic terms) tended to practice a range of different activities on the farm, ... When they did specialize in a single type of farming this tended to be either pig or poultry farming, or the production of permanent crops (especially olives). Larger farms were more likely to specialize in a particular type of farming, especially horticulture, dairy farming, pig farming and cattle rearing.” EUROSTAT (2016). Monitoring farm structure development TEAGASC has developed a series of National Farm Surveys for Ireland since 2010 in order to point out achievements and possible weak points of Irish farm structure development and, generating feedback for agricultural policy makers (ISSDA 2018). In 2016, DG Agriculture organized a workshop focusing on farm structure development of EU agriculture on how Common Agricultural Policy (CAP) can support a 21st century European model of Agriculture. It underlines that decline in number of farms was less in EU10 compared to EU15, and decline of small farms shows big differences in EU10 countries. (DG Agriculture, 2016). Mizik (2019) pointed out that CAP reforms resulted in increasing land concentration in EU10.

Research questions are as follows: How much extent catching up of EU10 agriculture to EU27 was achieved after one decade joining EU? What is the role of concentration and specialization to reach higher dynamics of output in EU10 agriculture? How strong is the relationship between specialized farm size and growth in EU10? How much extent the catching up of EU10 agriculture was a universal phenomenon in EU10 countries? How much extent the growth of area, labor and total productivity in EU10 have supported catching up of EU10 agriculture?

## **2. Methodology**

To obtain a deep insight into farms' performance from a specialization and farm size perspective point of view, EUROSTAT data set of 2005-2013 was used for analysis. Besides the structural development of specialized farms their labor use (AWU), land use (UAA) and production (Standard Output, SO) were analyzed. Such indicators as growth of area, labor and total productivity of farms were calculated. The performance of specialized farms was compared to that of non-specialized ones

and, analysis of their growth provides insight into the pattern of farms' development in 10 specialized farm types<sup>1</sup>, in five different farm size categories in EU10.<sup>2</sup>

This is the first time that specialization of farms in the EU10 has been analyzed by farm size and, results were compared to both EU27/15 average and that of non-specialized farms of the EU10 pointing out what advantages of specialization and farm size have had over a one decade adjustment in EU10.

### **3. Research results and discussion**

#### *Increasing share of number of specialized farms*

After a deep decline, still as many as 10.7 million farms worked in EU27 in 2013 in compare with 14.5 million of 2005. 58 % out of which went to EU10 with a decline exceeding EU27 average. 46.2 % of farms were specialized in EU27 and 44.7 % of it belonged to EU10 having one specialized farm in every three. Decrease of number of specialized farms in EU15 (19.5 %) exceeded that of EU10 (15 %). Decline of specialized farms in EU10 from 2005 to 2013 took place in all CEEs in farm size with UAA less than 5ha. The picture of EU15 is total different as the number of specialized farms increased in one farm size category only (UAA 100 ha and above) and declined in all others. Only the largest specialized farms in EU15 found land (UAA) concentration as a way of farm growth while, in contrast, in EU10 apart from small farms (below 5ha) in all farm size categories the land concentration has increased. Dynamics of specialized farms in EU10 varied by country and by farm size very much. The level of increase of number of specialized farms in different farm size with UAA 20ha and above in EU10 varied between 7.4 % in Estonia (50-99.9 ha) and 300 % in Slovenia (100 ha and above). Between 2005 and 2013 the bigger the specialized farm size by land from 20 ha and above, the higher the growth of number of specialized farms can be observed in 7 out of EU10.

#### *Concentration of land use in specialized farms*

Specialized farms found extending land area as a path of increasing competitiveness in EU27 having total 9.4 million UAA (54.1 %) in 2013. Of which small farms below 5ha had a share of 7.4 % in EU10 and only 3.8 % in EU15. However, these figures in case of farms with UAA of 50ha up to 99.9ha was 8.5 % in EU10 and 21.4 % in EU15. Largest farm extended their field at a higher speed and use more than half of land of specialized farms total in EU27. Specialized farms increased their UAA significantly in EU10 and the average land use of largest specialized farms in EU10 already exceeded that of EU15 in 2013.

#### *Specialized farms slow down pushing labor out of agriculture*

In EU27 9.3 million AWU was used in 2013 showing a decline by 25.1 % from 2005, more in EU10 (29.6 %) and less in EU15 (19.7 %). In 2013 small farms below 5ha used 55.5 % of labor in EU10 while it was only a bit over one quarter in EU15. Labor concentration in largest farms with land 50ha and above allowed to offer much less jobs in total in EU10 (10.8 %) compared to EU15 (30.7 %). In 2013 labor use of specialized farms by farm size was similar to that of non-specialized ones in EU15, but it was different in EU10 where big specialized farms with UAA 20ha and above used 26.6 % of labor, while in total farms the relevant figure of this farm category amounts to 17.7 % only. Decline

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<sup>1</sup> The following specialized farm types give the basis for analysis: 1. Specialized in cereals, oilseed and protein crops. 2. Specialized in horticulture indoor. 3. Specialized in horticulture outdoor. 4. Specialized in vineyards. 5. Specialized in fruit and citrus fruit. 6. Specialized in olive oil. 7. Specialized in dairy farming. 8. Specialized in cattle-rearing and fattening. 9. Specialized in pig production. 10. Specialized in poultry production.

<sup>2</sup> 1. below 5 ha (UAA), 2. 5-19.9 ha, 3. 20-49.9 ha, 4. 50-99.9 ha and 5. 100 ha and above.

in labor use of specialized farms was more differentiated between farm size categories in EU10. It is a general phenomenon that specialized farms pushed out much less labor from 2005 to 2013 in all farm sizes compared to total farm average both in EU10 and EU15. Apart from very small farms (below 5ha) all specialized farms in all farm size categories used more labor in EU10 in 2013 than in 2005. Such increase in labor use was only observed in the biggest farm size in EU15. In EU10, meanwhile farms total had around 30 % less labor in 2013 in compare to 2005, the decline of labor use was only 5.7 % in case of specialized farms. In EU10 specialized farms significantly slowed down the process of pushing labor out from the sector but the picture within EU10 varies. In three countries (Poland, Hungary and Czech Republic) specialized farms absorbed more labor in 2013 than in 2005. Poland is the only country in EU10 where specialized farms in all farm size categories used more labor in 2013 compared to 2005.

### *Growth of production*

EU27 increased production from 2005 by 14.9 % reaching 329 billion EURO in 2013. Growth of production was higher in EU10. Poland with highest agricultural potential has reached significant growth (28.9 %), while the lowest figure went to Romania (7.9 %). Speeding up of CEECs agriculture production based more on growth of specialized farms (70.4 %) well above EU15 average (17.5 %). Output of specialized farms more than doubled in Latvia, Bulgaria and Slovakia. In 5 out of EU10 share of specialized farms in Standard Output is above 60 % headed by Bulgaria 68.8 %. In total farms, Slovenia was only able to increase output in farms below 5ha. However, in farm category between 5.00-19.9ha there have been already 5 countries producing more in 2013 compared to base year. The bigger the farm size the higher the growth rate of farms total output in CEECs.

Higher speed of production growth of specialized farms reflected in the figures in smaller farm categories, too. Even in smallest farms below 5ha 5 countries out of EU10 had higher output in 2013 than in 2005. The higher growth produced by Slovenia (29.4 %). In farm category of 5-19.9 ha of specialized farms, apart from Estonia and Lithuania, in all CEE countries the production went up. Farms with UAA 50-99.9ha 7 CEECs more than or, almost doubled their output headed by Slovenia (300.8 %). While in farms 100ha and over already 8 countries reached high growth including 4 countries where production was tripled or was close to it. Latvia is the leading with 390.4 % followed by Lithuania (335.4 %) and Slovenia (315.8 %). Concerning specialized farms total 4 countries doubled Standard Output or was close to it. According to analysis *the bigger the farm size by land the higher the growth in production achieved*. Within that *specialized farms performed a more dynamic production development compared to non-specialized farms*. Increasing farm size and shifting towards specialization gave the path for farm development and creating basis for EU10 farms for catching up.

### *Changes in farm size*

#### *Land use (UAA/farm)*

Average farm size by UAA has gone up in EU27 since EU Eastward enlargement till 2013 from 11.9 ha to 16.2 ha. EU10 has an average farm size half of that of EU27 which ratio practically has not changed. In 2005 specialized farms average by UAA exceeded that of total farms in all EU10 (with the exception of Czech Republic) by 30.9 %. In Bulgaria specialized farms had almost three times more land than total farm average, and it is more than double in Estonia. In 2013, relative size of specialized farms in total farm average by land has become even bigger in all CEECs except in Czech Republic. Looking at increase in average farm size by farm categories it took place mostly

in all farm categories except the largest one but not in all EU10. E.g. the average farm size of small farms below 5ha declined in Romania (20.1 %) and Slovenia (8.1 %), that of largest farms (100 ha and above) increased only in 3 countries (Latvia, the Czech Republic and Bulgaria) but declined in Slovenia significantly (47.8 %). In 2013, land concentration in specialized farms went up and reached a level higher than that of total farm average in all CEECs except in Czech Republic

*Average farm size by land (total and specialized) of EU10 scattered by countries from few hectares up to 120-130 ha, however, that of specialized farms exceeds farms total average in all CEECs except in Czech Republic where, otherwise, both average of total and that of specialized farms are the highest (above 120ha) within EU10 member states.*

#### *Labor use (AWU/farm)*

Average AWU used by farms practically has not changed between 2005 and 2013. In 2013 still, it was 0.9 AWU in EU27, 0.8 in EU10 and 1.0 in EU 15 indicating farms in average did not find absorbing more labor as source of farm growth. Farms in EU10 used more labor in all farm categories than EU27 average both in 2005 and 2013 except in farms with UAA less than 5 ha, indicating production in larger farms is more labor intensive compared to that of EU 15. Specialized farms used less labor compared to total farm average in 8 out of EU10 in 2005 while it was lower only in 6 countries in 2013. In Slovakia, Poland and Hungary farms in general used significantly more labor in 2013 compared to 2005 while EU10 average decreased.

Specialized farm in EU10 increased labor use by 10.9 % headed by Slovakia (67.6), followed by Poland (49.3 %) and Hungary (47.5 %). Hungary used more labor both in 2005 and 2013 in all specialized farm categories except in the largest ones.

#### *Economic/productivity indicators*

Area productivity (SO/UAA): In 2005, farms in EU27 produced 1664 EUR/ha in average and gradually increased reaching 1902 EUR in 2013. Area productivity of farms of EU10 compared to EU27 average were 54.1 % and 58.2 % respectively. Small farms below 5ha used land extension for increasing output more intensively than larger farms and had the highest per hectare output between farm categories in each CEECs both in 2005 and 2013.

Small farms produced some 50 % more output per hectare than total farm average in 2005 and even a bit more than that in 2013. In the Czech Republic small farms below 5ha doubled area productivity from 2005 reaching 7015 EUR in 2013. Although, per hectare output of specialized farms total was a bit below the total farm average, however, in case of small specialized farms below 5ha this figure was 21 % higher than total farm average. E.g. in 2013 per farm output of small specialized farms in the Czech Republic exceeded 12200 EUR and, approaching 4000 EUR in Bulgaria and Slovakia contributing total specialized farm average of EUR 1060 in EU10. Farms of EU10 in total produced 19 % more per hectare in 2013 in comparison to 2005 showing a higher growth in farm categories with UAA 20 up to 99.9 ha. The growth in area productivity was higher in specialized farms (26.1 %) with a tendency the bigger the farm size the higher the growth in area productivity. Most of largest farms (100 ha and over) in EU10 could increase per hectare output at the highest level e.g. in Bulgaria (79 %), Latvia (79.5 %) and Slovakia (69 %). However, the highest growth of area productivity in Slovakia was achieved by farms with UAA 5-19.9 ha (115.4 %) and in Romania by farms with 50-99.9 ha (64.2 %).

In 2013, specialized farms of EU10 compared to total farm average have a little advantage concerning per hectare output. However, per hectare output of specialized farms was below national

average in the Czech Republic, Hungary, Romania and Slovakia. In EU10 area productivity of non-specialized farms exceeded that of specialized ones in the two largest farm categories (50-99.9 ha and 100 ha and over). Although, specialized farms have reached more progress in catching up the distance between EU10 and EU27 average it is still higher in case of specialized farms than total ones (51 % and 43.4 % respectively).

Labor productivity (SO/AWU): In 2005 in EU27 one AWU was used to produce almost 23 thousand EURO output which went up by 53.4 % to over 35 thousand EURO in 2013. EU10 had a much lower basis of labor productivity in 2005 (6300 EUR) but it increased faster (80 %) having per AWU output over 11 thousand EURO in 2013. Both in 2005 and 2013 it is a general picture that the bigger the farm size the higher the labor productivity in all EU10 countries with few exception in Hungary in 2005 and, Slovenia and Slovakia both in 2005 and 2013 in case of largest farms (100ha and above) and, in the Czech Republic (5-19.9ha) in 2005. *In case of specialized farms the bigger farm size means a higher labor productivity across all EU10 countries and all farm categories both in 2005 and 2013 with only one exception of Slovenia in largest farms both in 2005 and 2013.*

Labor productivity of EU10 has approached that of EU27 both in specialized and non-specialized farms, however, the distance between EU10 and EU27 declined more in case of specialized farms and less in total farm average. Larger specialized farms (50 ha and over) in CEECs had already reached the same distance to EU27 average as it can be observed in case of non-specialized ones. In 2013 labor productivity of specialized farms exceeded that of total farms in all EU10 countries resulting in 43.9 % growth at EU10 average level. However, the picture varies to some extent according to farm size and country. Level of labor productivity is generally higher in specialized farms across EU10 and all farm categories, however, the growth rate of labor productivity shows different picture by farm size. In CEECs in all 5 farm categories there are minimum one country (in 4 categories minimum 3 countries) where growth of labor productivity of non-specialized farms exceeded that of specialized ones.

Total farm productivity (SO/farm): Farm production average in EU27 amounted to 19.8 thousand EUR in 2005 which went up to 30.8 thousand EUR in 2013. This figure also increased significantly in EU10, however, its level approached still only 30 % of EU27 average. *The bigger the physical farm size of farm the narrower the distance in per farm output between EU10 and EU27.* The distance declined over time only a little in small farms but more in larger farms. Even, in largest farm category (100 ha and above) per farm output of EU10 exceeded that of EU27 average while in farms with land 20.0– 99.9 ha EU10 average was only above half of that of EU27 in 2013.

#### *Comparative analysis of dynamics of productivity indicators*

The distance of area, labor and total productivity of farms between EU10 and EU27 was substantial in 2005. Since Eastward enlargement CEECs started to catching up. Dynamics of productivity indicators of EU10 well exceeded that of EU15 average.

As far as growth of area and labour productivity are concerned, specialized farms in EU10 show higher dynamics compare to non-specialized farms. However, due to land concentration and increase of both area and labour productivity, total productivity of all farms of EU10 increased by 68.9 %, above EU15 average while in case of specialized farms it was 100.4 % and 48.5 % respectively (Table 1).

Table 1

**Dynamics of productivity indicators of farms total and specialized farms with UAA, % (2013/2005)**

Country	SO/UAA		SO/AWU		SO/Farm	
	total	spec	total	spec	total	spec
<b>Bulgaria</b>	84.0	138.7	283.1	299.5	304.5	350.8
<b>Czech Republic</b>	122.2	127.1	171.3	176.0	190.4	212.7
<b>Estonia</b>	121.3	126.5	241.8	221.7	207.0	205.0
<b>Latvia</b>	149.2	154.7	277.3	289.2	261.3	296.5
<b>Lithuania</b>	117.5	120.7	185.9	212.9	177.3	210.2
<b>Hungary</b>	107.4	114.8	125.6	139.7	171.4	206.0
<b>Poland</b>	132.0	125.2	153.5	144.1	223.6	215.1
<b>Romania</b>	114.9	126.9	180.0	221.7	124.7	170.5
<b>Slovenia</b>	118.7	120.7	136.5	151.5	126.7	142.6
<b>Slovakia</b>	135.5	156.2	268.1	313.2	413.0	525.0
<b>EU 27</b>	112.8	108.5	152.0	139.0	153.2	148.5
<b>EU 10</b>	119.0	123.9	174.9	180.7	168.9	200.4
<b>EU 15</b>	112.3	110.9	140.1	138.8	147.1	146.0
<b>EU 10/EU 27</b>	105.6	114.3	115.1	130.0	110.3	135.0
<b>EU10/EU15</b>	106.0	111.8	124.8	130.1	114.8	137.2

Source: author's calculation based on EUROSTAT data

The picture is varied by country. In Poland, higher growth in all 3 indicators went to non-specialized farms. The distance of productivity level between EU10 and EU15 has been narrowing but it is still a challenge for CEECs to continuing catching up.

## Conclusions

- 1) Production of EU27 increased from 2005 to 2013 by 14.9 % and by 26.7 % in EU10. Number of specialized farms declined in EU10 but to a less extent than that of EU27. Number of specialized farms in all farm categories from 20ha and up increased in more CEECs.
- 2) With few exceptions, the larger the specialized farm size by land, the higher the dynamics of output across EU10 countries. In contrary to EU27, the number of specialized farms has increased in more EU10 countries concerning farm categories with UAA 20 ha and above.
- 3) Concerning decline in labour use, specialized farms pushed out less labour from the sector compared to total farm average from 2005 to 2013 and it was less in EU10 in average than that of EU27.
- 4) Concerning output of specialized farms, EU10 had a share of 36.8 % in 2005 but it went up to 49.5 % in 2013, nevertheless it is still below the EU27 average (61.4). Largest specialized farms more than doubled output in 7 out of EU10 countries.
- 5) On average, area, labour and total productivity in specialized farms at EU10 level have achieved higher growth than non-specialized farms in all EU10 countries apart from Poland and so in case of total productivity in Estonia. Per farm output was doubled in specialized farms in EU10 well above that of total farm average (68.9 %).

- 6) Between 2005 and 2013 labour productivity both in total and specialized farm average more than doubled in Bulgaria, Estonia, Latvia and Slovakia and, it was also so in Romania and in Lithuania in case of specialized farms.
- 7) Results of catching up of EU10 agriculture has been significant between 2005 and 2013 and the main drivers of such development have been the increasing level of land concentration and specialization; and within that, the engine was the group of specialized farms and more of larger ones.

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