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EU agricultural policy and productivity of soil in countries varying in terms of intensity of agricultural production

1. Introduction

Regardless of the system of farm production (extensive or intensive management in the agricultural sector), it is still impossible to make agriculture non-dependant on the soil and conditions surrounding it. It is not the only user of the soil but it is the key one due to the character of production and taking large areas of land (Baer-Nawrocka, Mrówczyńska 2007, Maśniak 2010). Most often, intensification is associated with an industrial (conventional) agricultural model which was common from the end of the Second World War (Zegar 2014, pp. 198-199, 203). The example of agriculture and agricultural policy in the EU shows that political conditions play a significant role in creating the bases for development of farming and its intensification. The EU agricultural policy, (Common Agricultural Policy - CAP) was created as a response to the need for providing food safety to the citizens of Europe and despite its significant evolution that has taken place throughout more than 50 years, one should be aware that such changes were possible owing to achieving such safety

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(Judzińska, Łopaciuk 2011, Zieliński 2016). To support this statement, the initial aims of EU's agricultural policy should be mentioned. Article 33 of the Treaty establishing the European Community defines them as follows (Version from 2016):

- to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour,
- thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture,
- to stabilise markets,
- to assure the availability of supplies,
- to ensure that supplies reach consumers at reasonable prices.

The above also shows that countries with longer membership in the EU were subjected to a bigger extent to the impact of institutional conditions aiming at increasing agricultural productivity in Europe which is reflected in the initial aims of CAP. The reform of the EU agricultural policy in 1992 finally stimulated methods of less-intensive agricultural production in the EU through changes on particular agricultural markets (Brouwer, Lowe 2000, p. 5, more about the subject of greening the European agriculture, see: Fiedor 2004). Due to the above, in the EU-15 countries, one can talk about higher intensity of agriculture as compared to EU-12. This also results from the research of A. Tarnowska (2014, p. 216) where she stated that in EU-15 countries, more than 2-times higher productivity of soil occurred in 2012 when compared to EU-12 countries. The differences resulted from a variety in the level of intensity of production between the compared groups in favour of EU-15 countries. Due to the above, it was decided to answer the following question: were there any significant differences in the last financial perspective of the EU (2007-2013) in terms of soil productivity of representative farms from countries of EU-15 and EU-12, and did the subsidies from CAP reduce these differences? A hypothesis was made in the article that including subsidies from the Common Agricultural Policy in the total production generated from farming causes absence of the significance of differences, in the productivity of soils from EU-15 and EU-12 countries. For this purpose, a comparative analysis was conducted for the indicators of soil productivity which was a relation of the total production value from farming per hectare (ha) of agricultural land (AL) in EU-15 and EU-12 countries in particular years in the period of 2007-2013 in two varieties. In the first one, the value of production from agricultural activity did not contain the value of subsidies

from CAP, whereas in the second one it was added.¹ The value of subsidies for agricultural production was obtained by adding the following subsidies: subsidy for plant production, for animal production, for development of rural areas, for indirect use, for costs of external factors, uniform region fee and for farms, as well as remaining subsidies (Floriańczyk, Mańko, Osuch, Płonka 2014, pp. 23-26). Then, the statistical significance was compared in terms of differences between the soil productivity indicators for representative farms from countries of EU-15 and EU-12 in 2007-2013 in those two varieties. Because the compared groups of countries did not meet the assumption concerning equal numbers and the sample covered 27 countries, in order to assess the significance of differences between the average values of two independent samples (EU-12 or EU-15 countries), the nonparametric Mann-Whitney U Test was applied (Stanisz 2007, p. 246). The grouping variable was the membership of a given country to EU-12 or EU-15 while the explanatory variables were the values of soil productivity indicators excluding and including the value of subsidies for farm production, in each of the years of the research period.² In the calculations, data from FADN was used applicable to representative farms from particular EU-27 countries. The timeframe of the analysis covered a period in 2007-2013, the subject scope covered representative farms from particular countries of the EU in the years of the researched period applying their division into countries creating EU-15 and EU-12, while the spatial scope covered the region of EU-27.

2. Common Agricultural Policy vs. productivity of soil in countries of EU-15 and EU-12 in 2007-2013

The average productivity of soil without subsidies in the entire research period in EU-15 countries was PLN 2960/ha and was 21% higher than in EU-12 countries, where it amounted to PLN 2441/ha. When it comes to the value of this indicator after taking into account the value of CAP subsidies in the quantity of agricultural production, it was equal to PLN 3431/ha of farmland for EU-15 countries and PLN 2857/ha of farmland for EU-12, so the level of differences in soil productivity after adding the value of subsidies for production from agricultural

1 The value of production from farming covers: sales, transfer to household, use for farm purpose, difference in stock, difference in the value of livestock resulting from a change of prices reduced by purchase of livestock (Floriańczyk, Osuch, Płonka 2015, p. 20).

2 The differences between the average values from both groups are statistically significant when the significance level is $p < 0.05$.

activity between countries of EU-15 and EU-12, was only lower by 1% and still amounted to 20%. On this basis one can say that the EU agricultural policy during the last financial perspective (2007-2013) did not contribute to limiting the differences between productivity of soil in the countries of EU-15 and EU-12 while the differences in this scope between countries differing in the intensity of agriculture remained at a fixed level (compare with fig. 1 and 2). The EU-15 countries that recorded the biggest increase of the soil productivity indicator in 2007-2013, owing to including the value of CAP subsidies for agricultural production included Finland (57%) and Ireland (40%), while the lowest increase took place in the Netherlands (4%) and Denmark (9%). On average, in EU-15 countries this change amounted to 22% and reflected the increase in EU-12 countries (also 22%). In EU-12 countries, the differences were lower than in EU-15. The biggest increase of the soil productivity indicator taking into account the subsidies in the entire research period was recorded in Slovakia (31%), Slovenia (29%) and Czech Republic (26%), while the lowest was recorded in Malta (13%) and Romania (15%).

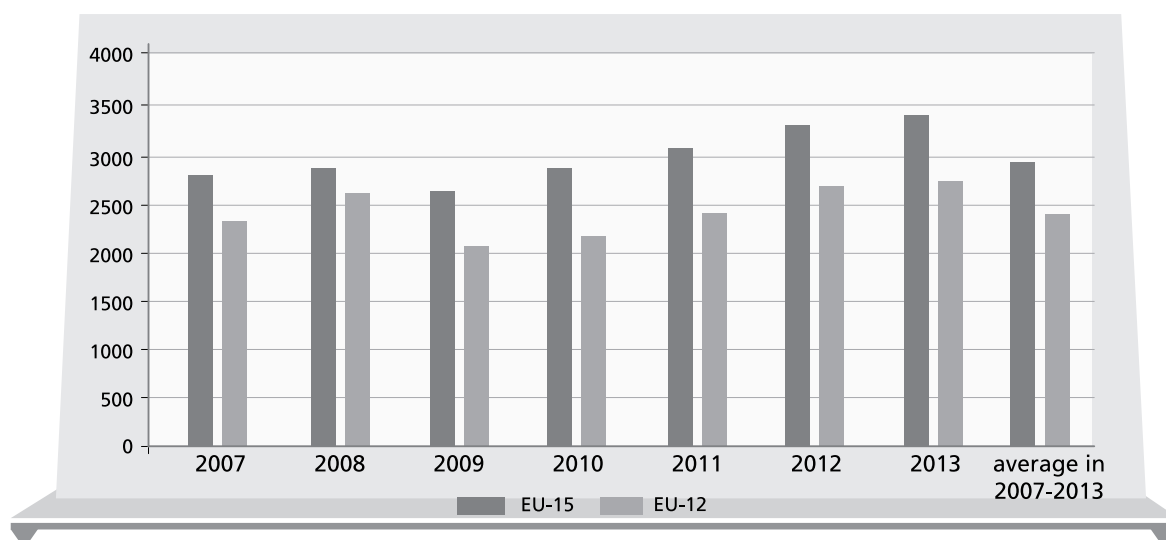


Figure 1. Productivity of soil in EU-15 and EU-12 countries in PLN/ha of farmland without the value of subsidies in the value of agricultural production

Source: own work based on FADN data

Comparative analysis from fig. 1 and 2 indicated that subsidies from the EU agricultural policy do not significantly limit the differences in soil productivity

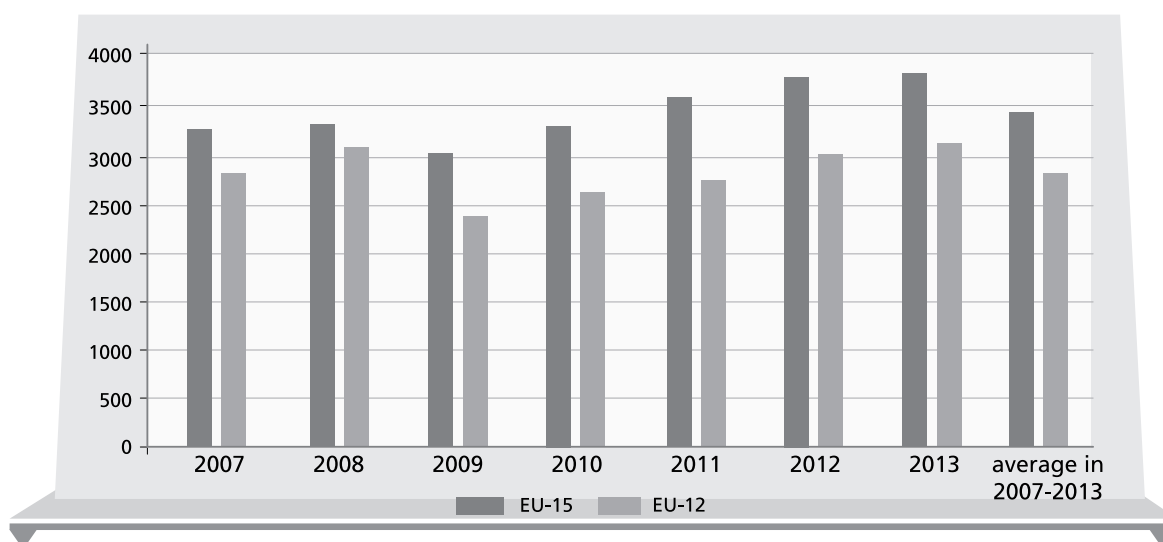


Figure 2. Productivity of soil in EU-15 and EU-12 countries in PLN/ha of farmland taking into account the value of subsidies in the value of agricultural production

Source: own work based on FADN data

of farms in countries varying in terms of agricultural production intensity. This was also confirmed by the results of the Mann-Whitney U test (see: table 1).

Table 1. Levels of difference significance (value p) between countries of EU-12 and EU-15 within the scope of soil productivity (with subsidies and without subsidies) in 2007-2013

Description*	2007	2008	2009	2010	2011	2012	2013
without subsidies	0.054	0.054	0.034	0.034	0.043	0.030	0.026
with subsidies	0.042	0.043	0.023	0.030	0.043	0.030	0.043

*p<0.05 levels in the table were marked in bold which means differences that are statistically important.

Source: own work based on FADN data

In each of the analysed years after taking into account the value of subsidies from CAP in agriculture production, there were no statistically significant differences in the scope of soil productivity between EU-15 and EU-12 countries. This is confirmed by the p values which were at the level below 0.05 in each of the researched years (see: table 1). The fact of taking into account the value

of subsidies from the EU agricultural policy in the value of production from agricultural activity increased the level of differences in terms of soil productivity between countries differing in terms of agriculture intensity. This took place in 2007 and 2008. In this period, the differences in soil productivity indicators between countries of EU-15 and EU-12 not taking into account the CAP impact, were statistically insignificant whereas after including the value of subsidies from the EU agricultural policy in the value of agricultural production, they were statistically important. The following hypothesis was rejected: including subsidies in the Common Agricultural Policy in the total production generated from farming causes absence of the significance of differences, in the productivity of soils from EU-15 and EU-12 countries.

3. Conclusions

Regardless of the degree of agricultural production intensity, soil remains the factor that is necessary for farming. Apart from capital and labour, it is the basic factor in agricultural production despite the fact that its significance changes depending on the type of the production of a given farm, i.e. its specialisation. Its availability also determines the degree of agricultural production intensification since this phenomenon is expressed by the relation between the labour and capital factors, and the soil factor. Its degree is measured by means of the level of consumption of man labour input and production means per unit of land area. This means that agricultural production is more intense once the man labour input and production means are increased per 1 ha of farmland (Czyżewski, Smędzik-Ambroży 2013, pp. 28-29). Intensification is often associated with a supply-oriented model of EU agricultural policy which existed until its development because its basic aim was to ensure food safety to citizens of Europe after Second World War. Due to the above, in the countries of EU-15 there was a bigger intensity of agriculture than in the countries of EU-12 which is reflected in higher productivity indicators in those countries, as compared to the countries of EU-12. It was anticipated the CAP, through subsidies which constitute a remuneration for farmers due to supplying various goods (not only food but also environmental goods), will cause to balance out the differences in the scope of soil productivity between countries of EU-15 and EU-12. The completed research proved that an opposite phenomenon occurred in the EU, i.e. the level of differences in the scope of soil productivity between countries with varied intensity of production in terms of the EU agricultural policy, increased which was clearly exhibited in

the levels of difference significance in the Mann-Whitney U test for 2007 and 2008. To conclude, it should be mentioned that the differences between the soil productivity indicators for countries of EU-15 and EU-12 in 2007-2013 retained despite the impact of the Common Agricultural Policy of the EU. One may assume that this is a result of differences in the duration of farming being subject to the compared groups of countries, institutional conditions generated by the EU agricultural policy as well transition of its supply-oriented goals into demand-oriented goals, as time passed.

Summary

EU agricultural policy and productivity of soil in countries varying in terms of farming intensity

It was emphasised in the work whether there are differences in soil productivity of FADM farms from countries belonging to EU-15 and EU-12, and whether CAP subsidies impact the degree of these differences. For this purpose, a comparative analysis was conducted for the soil productivity indicators (taking into account the value of CAP subsidies in the value of production from agricultural activity and without such subsidies) as well as a statistical assessment of differences between those indicators in EU-15 and EU-12 countries based on the Mann-Whitney U test. EU-FADN data was used in the work. The timeframe covered the period of 2007-2013, the spatial scope covered EU-27 countries while the subject scope covered farms representative for particular EU-15 and EU-12 countries. A hypothesis was made that including subsidies from the Common Agricultural Policy in the total production generated from farming causes absence of the significance of differences, in the productivity of soils from EU-15 and EU-12 countries. As a result of the conducted analyses, it was confirmed that CAP subsidies increase the difference in the scope of soil productivity between farms from EU-15 and EU-12 countries. A bigger level of differences occurred between FADN farms from countries composing EU-15.

Keywords: *soil productivity, agricultural intensity, EU agricultural policy, EU-15, EU-12.*

Streszczenie

Polityka rolna UE a produktywność ziemi w krajach różniących się intensywnością rolnictwa

W opracowaniu określono, czy występują różnice w produktywności ziemi gospodarstw FADN z krajów należących do UE-15 i UE-12 oraz czy dopłaty ze wspólnej polityki rolnej wpływają na wielkość tego zróżnicowania. W tym celu dokonano analizy porównawczej wskaźników produktywności ziemi (z uwzględnieniem wartości dopłat ze wspólnej polityki rolnej UE w wartości produkcji z działalności rolniczej oraz bez nich) oraz oceny statystycznej zróżnicowań pomiędzy tymi wskaźnikami w krajach UE-15 i UE-12, w oparciu o test U Manna-Whitneya. W opracowaniu zastosowano dane EU-FADN. Zakres czasowy obejmował lata 2007-2013, przestrzenny kraje UE-27, zaś podmiotowy gospodarstwa reprezentatywne dla poszczególnych krajów UE-15 i UE-12. Postawiono hipotezę, że uwzględnienie dopłat ze wspólnej polityki rolnej w produkcji ogółem z działalności rolniczej, powoduje brak istotności różnic, w produktywności ziemi gospodarstw z krajów UE-15 i UE-12. W wyniku przeprowadzonych analiz dowiedziono, że dopłaty z WPR zwiększają zróżnicowanie w zakresie produktywności ziemi między gospodarstwami z krajów UE-15 i UE-12. Wyższe zróżnicowanie wystąpiło pomiędzy gospodarstwami FADN z krajów tworzących UE-15.

Słowa

kluczowe: *produktywność ziemi, intensywność rolnictwa, polityka rolna UE, UE-15 i UE-12.*

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