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THE ROLE OF EU DIRECT PAYMENTS FOR PRODUCTION DECISION-MAKING IN BULGARIAN AGRICULTURE

SUMMARY

One of the main instruments of the European CAP – the direct payments - play an important role for the Bulgarian agriculture after country's EU accession in 2007. Field crops, horticulture, and dairy farming are traditional sectors in Bulgaria with high share of the total agriculture output.

The main goal of this study is to determine the impact of subsidies on the production decision-making. The main assumption is that subsidies despite their decoupled characteristic take part in farmers' incomes and influence the farmers' behavior due to farmers' impetus to less risk and costs rather than maximizing their incomes and revenues. The analysis is based on official statistical data and Farm Accountancy Data Network (FADN). Key economic indicators and the impact of Single Area Payment Scheme (SAPS) payments are explored. The data span covers the period 2005-2012. Correlation and regression analyzes based on data are done, aiming to study of dependence on the main economic indicators on subsidies.

As a result of the research conclusions are drawn about the level of impact of direct payments and farmers' behavior and sensitiveness to subsidies and market signals. The analysis shows that farms growing field crops and those in dairy sector are positively influenced by the SAPS payments they receive; and this could be considered a factor in deciding on type of crop and farmers' behavior in market environment. The direct payments are important instrument driving farmers' production decision making in terms of land enlargement and expansion and less impact on the level of production and productivity.

Keywords: subsidies, Bulgaria, field crops, horticulture, livestock

INTRODUCTION

The EU accession in 2007 brought about many challenges in Bulgaria. One of the greatest that the agricultural sector faces is to operate under the EU requirements and the Common Agricultural Policy (CAP). The financial support the Bulgarian farmers have received through First and Second Pillar of CAP led to structural changes, modernization of the holdings and gave more opportunities for development to the farmers. The European direct subsidies, organized as a single area payment, however, are targeted mainly to the agricultural holdings

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and farms that have more arable land and that are practicing more extensive forms of agriculture. The agriculture holdings and farms, specialized in horticulture, permanent crops or animal production, were left in disadvantaged position in regard to the public support. Restructuring in the industry was observed in two parallel directions – business concentration (reduction of the number of farms and increase of their average size) and increasing of the relative weight of grain, feed and industrial crops production at the expense of intensive sectors. European subsidies and national payments played a role in stimulating both.

The added value of the agricultural sector in the last few years amounted to more than 2 million levs that is about 5% of GDP. Although the share of agriculture in GDP and the gross value added (GVA) in the economy of Bulgaria decreases, it accounts to more than 16% of the country's exports and it provides employment to over 10% of the active age population and 19% of the total population in 2013. Despite the increase in the UAA and the consolidation, gross value added created by agriculture fell by nearly 19% between 2000-2013. After 2007 there is an accelerated growth in the share of total output created by the plant production sectors (especially after 2010). The reasons for this should be sought in particular in the support based on the area payments that encourages the extensive development of agricultural production (Popov, 2011). The proportion of total production, created in the livestock sectors after 2007 has a downward trend. The reduction in the milk quantities produced is about 2% for a 6-year period, while the meat production declined with about 15%. The decrease of the quantities of vegetables production is around 10%. After 2007 there is an increase trend for the average size of the farms and reduction in their number. The largest farms (> 100 ha) show rapid development, and in 2010 they already manage over 82% of the agricultural land. Their average size reached 671.7 ha while it was 538.5 hectares in 2005. By comparison, the average size of the farms over 100 hectares in the EU-27 is 264 hectares. The average size of all farms in the country is also rapidly increasing - from 7.3 hectares in 2007 to 10.1 ha in 2010 and 15.2 ha in 2013, according to the department of "Agricultural Statistics" of Ministry of food and agriculture.

There are several reasons for these structural changes that are closely related to the country's membership in the EU. Some are the technological requirements of this intensification of agricultural production, the lack of preparation of the sector for the developed EU competition, the entry of supermarkets in the retail trade, the presence of very small holdings in the sector of fruits and vegetables, the unfair competition by the neighbouring countries, and the lack of associations of vegetable and fruit producers. All this in combination with direct payments per area, promoted the development of certain industries and created disincentives for others.

The specific impact of the subsidies and of the direct payments in particular is a subject to a wide range of studies, both in our country and abroad. The desire of the economists and policy makers in the EU is to have a specific

quantification of this impact, but at the same time to determine wide range of expected and realized socio-economic effects (Bachev et al., 2012; Koteva, 2014). In the process of formulation of CAP reforms for the period 2014-2020 it was assumed that direct payments are still an indispensable tool without which it would be difficult to achieve key policy objectives, namely to ensure food security and a fair standard of living for people employed in agriculture. It should be borne in mind that any intervention distorts the current market relationships and forces. Although direct decoupled support is minimally distorting market signals it is evident in the new Member States that the organization of payments leads to unnatural concentration of productive resources, the main of which is the land, in the extensive low capital-intensive productions.

This study aims to analyze whether and to what extent subsidies received by farms in Bulgaria have contributed to the production and marketing decisions made by the farmers and thereby contributed to the managing decisions made by the producers. Using quantitative methods and statistical measurement of relationships and dependencies we found the level of industry's dependence on subsidies they receive and their effect for the sectors. The main limitations of the analysis are related to the relatively short time series data we have due to the period during which the FADN collects such data in Bulgaria.

MATERIAL AND METHODS

The data used in the analysis is from the Farm Accountancy Data Network for the period 2005-2012, and data on economic accounts in agriculture from the National statistical institute for the period 2005-2014.

Accounting data collected by the FADN is based on samples of farms. The survey covers holdings that are considered market-oriented (EC, 2008), the main criteria is that they have an economic size over 1 ESU (SO $\geq$2000 euros). The received average results are representative of the groups and agriculture as a whole.

For the purposes of this analysis we used the five category classification of farms, based on their specialization - farms that grow field crops, horticulture farms, permanent crops farms, farms with grazing animals and farms for pigs and poultry (granivors). The indicators that are the subject of analysis are: Gross output, Total area, Number of animals, Total subsidies (including all subsidies received by farms - decoupled and coupled, without investment subsidies). The main part of these subsidies is payments per area, part of the first pillar of the CAP.

The study is based on the methods of econometric modeling, through the implementation of regression analysis and implementation of scenarios that allow the isolation of the effect of direct payments. A two factor regression analysis (Goev, 1996; Saykova et al., 2002) is used. The overall look of the two-factor model could be presented in the following way:

$$Y_i = f\left(X_i, X_j, e_i\right) \quad (1)$$

Where Y_i is the dependent variable, X_i and X_j are explaining variables, and e_i is a random component. In our case as a dependent variable was considered the total area for each type of production in Bulgaria and respectively, the total number of animals, according to the National Statistical Institute (NSI) and Ministry of Agriculture and Food (MAF) and X_i and X_j are respectively net income from operations, calculated as the difference between total output and intermediate consumption average per farm and received subsidies per farm.

The second group of models associated with assessing the impact of subsidies and intermediate consumption on gross production. Here a two-factor regression model was also used. It could be presented as follows:

$$Y_к = f\left(X_g, X_j, e_i\right) \text{ (2)}$$

Where Y_k is the dependent variable Gross output, X_g and X_j are the explaining variables - Intermediate consumption and Subsidies and e_i is a random component.

The equations (1) and (2) could be transformed as:

$Y_i = \alpha + \rho\acute{\epsilon}X_i + \rho\acute{\epsilon}X_j + e(3)$

$Y_k = \alpha + \rho\acute{\epsilon}X_g + \rho\acute{\epsilon}X_j + e(4)$

To isolate the effect of each of the independent variables dummy variable ρ is introduced, which accordingly takes values 0 or 1. The model also includes $\acute{\epsilon}$ that is the elasticity of the change of the dependent variable on the change of the explanatory variable and is included as a factor in the model as an average from 2005 to 2012. When calculating the elasticities only real values are taken within the range from 0 to 1.

In this way, the elasticity is obtained in the formula:

$\acute{\epsilon} = \Delta Y / \Delta X(5)$

The assessment of the adequacy and statistical significance of the models and analysis of the results is based on the level of significance of the F criterion. For adequacy were adopted models in which the Sig. <0.05. Analyzes and calculations were performed with the software product Excel 2010.

RESULTS AND DISCUSSION

The development of agriculture in Bulgaria after the European Union accession in 2007 is directly related to the implementation of the Common Agricultural Policy. The development of the areas with major crops was strongly influenced by the political objectives and the implemented political measures. The increase in the area with grain and oilseeds is almost 20% (Fig. 1). The implemented correlation and regression analyses showed strong dependence of the area with agricultural crops of subsidies received. This relationship is stronger for the field crops, where the subsidies have highest stimulating effect (Table 1). The discussed two-factor regression model was adequate following the statistical requirements. Based on the developed scenarios with and without subsidies it was made clear that over 50% of the change in the area under consideration was due to receipt of farm subsidies. The largest share of these subsidies is through the Single area payment scheme (SAPS). Literature treats

decoupled payments as a minimum market distorting. What became clear when analyzing the development of agriculture in Bulgaria, however, it is that the sectors that utilize larger areas receive greater subsidies and they have an incentive to increase their production areas further. The productions that are more land intensive further lose market power and are subjected to a greater degree of market volatility, depending on price and market fluctuations. This leads to a larger percentage of exits from production for farms in horticulture and permanent crops sectors.
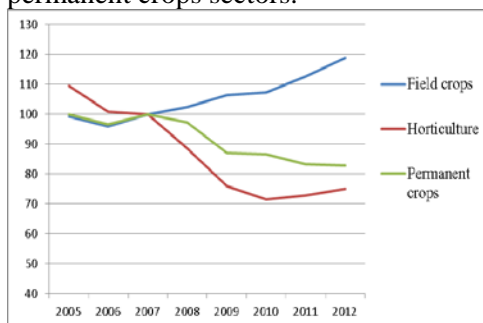
Source: MAF, own calculations

Figure 1 Major crops - area, indexes, 2007=100
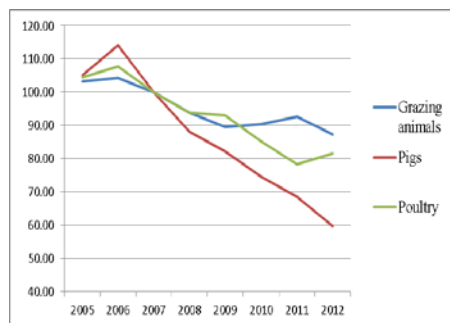
Source: MAF, own calculations

Figure 2 Animals number, indexes, 2007=100

In considering the models for development and dynamics of the areas with vegetables and permanent crops, we found out that the horticulture model was statistically significant and adequate but the subsidies impact was minimal, and they are not able to contribute to overcoming negative trends facing the analysis. The impact on the market is considerably larger. However the subsidies have a sustaining role since the considered scenarios without them showed that reduction of area would have been even greater (Table 1). The developed regression model for the area with permanent crops was statistically insignificant. This could be explained not only with the length of the observed time series but with the specificities of the production. Having an area with permanent crops makes it harder to react on market signals. However, based on the developed scenarios it could be considered that in case of absence of these subsidies, the areas under permanent crops would be reduced even further.

Table 1. Main effects of the subsidies on the area with different crops and animal numbers

	Change area/animal numbers, 2007-2012	Effect of subsidies	Average effect
Field crops	18.82%	stimulating	46.87%
Horticulture	-25.03%	sustaining	4.64%
Permanent crops	-17.21%	sustaining	0.84%
Grazing - dairy and others	-12.60%	sustaining	6.07%
Granivors - pigs	-40.25%	sustaining	19.60%
Granivors - poultry	-18.38%	sustaining	23.56%

Source: own calculations, based on MAF and FADN data.

Livestock is also a sector that experiences a significant decline in livestock numbers (Fig. 2). Only the number of poultry showed some growth in the last few years. The number of grazing animals and cattle specifically also showed some growth after the steady decline in the beginning of the period. It is expected that the new policy measures, part of CAP 2014-2020 will further contribute to overcoming the negative trend in the coming years.

In carrying out the regression analysis on the impact of subsidies and market revenues on the number of animals bred in the country we established the relationship between the variables. The analysis was carried out for grazing animals, pigs and poultry. Subsidies paid for the period 2005-2012 year have minimal impact and cannot explain the changes in the number of animals bred in the country. However they managed to help sustaining numbers that would have been much lower without the payments (Table 1).

In assessing the impact of subsidies on gross output in the sectors we also implemented two-factor regression analysis. The gross output in field crops production is characterized by a sharp increase, a relatively small increase in vegetable production, and a decline in permanent crops. This sharp increase in field crops is due to the growth of prices in the period considered and not necessarily to the natural value of the indicator (Fig. 3).
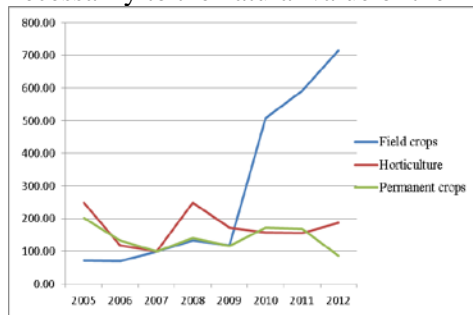
Source: FADN, own calculations

Figure 3. GO per holding, indexes, 2007=100
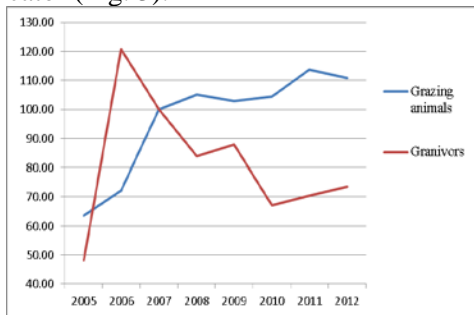
Source: FADN, own calculations

Figure 4. GO per holding, 2007=100

The regression model for field crops was statistically significant (Sig < 0.05) and the value of the regression coefficients showed the positive correlation between the dependent and independent variables. About 30% of the change in GO is due to the subsidies received, mostly through SAPS (table 2). The model for vegetable crops was also statistically significant and 60% of the changes of GO could be attributed to changes in IC and subsidies (R^2 = 0.58). The importance of subsidies alone, however, is minimal, only about 10% and they have sustaining effect. The permanent crops model is also statistically significant and adequate. The explanatory power of the model is high - R^2 = 0.73. According to the performed analysis of scenarios the situation without subsidies would have been even worse (with almost 25%).

The gross output of farms with grazing animals increased in 2012 compared with 2007. The GO of granivors however showed a decline after the EU accession and slowly begin to recover in the last 3 years of the period (Figure 4). To some extent the increase in the average value of gross farm output is due to the restructuring of the sector. Many small farms ceased their activity and others expanded their herds and sizes. It was revealed that about 17% of the changes in GO for grazing animals sector was due to changes in the subsidies received by farms.

Table 2. Main effects of the subsidies on the GO

	Change GO per holding, 2007-2012	Effect of subsidies	Average effect
Field crops	613.00%	stimulating	31.03%
Horticulture	86.97%	stimulating	10.12%
Permanent crops	-12.97%	sustaining	24.26%
Grazing - dairy and others	10.85%	stimulating	17.87%
Granivors	-26.38%	sustaining	22.68%

Source: own calculations, based on MAF and FADN data

In farms with pigs and poultry, the importance of subsidies is not significant; however, because many of these farms have areas with forage, they still receive a certain amount of subsidies under the direct area payments. The granivors are most steadily growing sector in the past few years, despite the strong decline in the beginning of the period.

CONCLUSIONS

The increase in the size of the area with field crops - cereals, oilseeds - is affected the most by the subsidies received. Reduction of the areas occupied by intensive type of production /vegetables and permanent crops/ are influenced less by the subsidies and although they have some sustaining affect, the role of market and price fluctuations is stronger. The dependence is confirmed by the developed regression model, which proves that the increase of area with field crops is strongly affected by the subsidies, and hence we could say that the producers have more incentives to engage in such a production.

The subsidies have minimal impact for the livestock sector so far and they cannot explain the changes in the number of animals bred in the country. The amount of aid received has a sustaining effect. The livestock operations with more pasture lands and producing their own fodders are more positively affected by the area subsidies that also plays role for production decisions. The change in gross output derived from field crops can be attributed largely to changes in input and received subsidies. One third of the overall change in GO in grains and oilseeds is due to the subsidies received by farms, while for the horticulture, the importance of subsidies is minimal.

The increase in the average value of gross output of livestock farms is mainly due to the restructuring of the subsector. Statistical analysis shows that only about 17% of the change in GO is due to changes in the subsidies received by farms.

The results of the analysis of the state of the sub-sectors of Bulgarian agriculture due to the subsidies and the SAPS support the assertion that the subsidies have mixed impact on attitudes and decision-making by farmers. Subsidies have a motivating role in the cultivation of extensive crops, while for the permanent crops, vegetables, and animals; their role is limited to a sustaining less negative trends observed in recent years.

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