PRINCIPALII FACTORI DETERMINANȚI AI PRODUCTIVITĂȚII SECTOARELOR AGRICOLE DIN LITUANIA ŞI GERMANIA: CARE ESTE ROLUL PROGRAMELOR DE DEZVOLTARE?

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Principalele scopuri ale lucrării sunt de a prezenta dezvoltarea indicatorilor de productivitate a sectoarelor agricole din Lituania şi Germania şi de a discuta rolul şi potenţialele contribuţii a măsurilor de sprijin din cadrul programelor de dezvoltare rurală (PDR). Articolul se va axa pe productivitatea sectorială şi profitabilitatea indicatorilor incluşi în Cadrul Comun de Monitorizare şi Evaluare a politicii de dezvoltare rurală în UE şi realizarea unei analize statistice comparative a indicatorilor de sprijin pentru perioada 2000 – 2011. Rezultatele analizei indică că impactul finanţării PDR asupra dezvoltării economice sectoriale este destul de limitată, iar alţi factori care intervin joacă un rol mult mai mare. Analiza ulterioară examinează relaţiile specifice cauzale dintre principalii factori determinanţi ai competitivităţii şi PDR la nivel regional. Acest lucru ar crea o mai buna intelegere a modului în care factorii regionali specifici pot împiedica sau favoriza efectele economice pozitive ale măsurilor de dezvoltare rurală pe sectoarele agricole din UE.

Cuvinte cheie: *productivitate, competitivitate, rentabilitate, sprijin.*

KEY DETERMINANTS OF THE PRODUCTIVITY OF THE AGRICULTURAL SECTORS IN LITHUANIA AND GERMANY: WHAT ROLE DO RURAL DEVELOPMENT PROGRAMMES PLAY?

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The main objectives of the paper are to review the development of productivity indicators of the agricultural sectors in Lithuania and Germany and to discuss the role and potential contributions of the support measures in the Rural Development Programs. The paper will focus on sectorial productivity and profitability indicators included in the Common Monitoring and Evaluation Framework (CMEF) of rural development policy in the EU and carry out a comparative statistical analysis with policy support indicators over the period 2000 to 2011. The results of the analysis indicate that the impact of RDP funding on sectorial economic development is rather limited and other intervening factors play a much bigger role. Further case study analysis is required to examine the specific causal relationships between the main determinants of competitiveness and RDPs at regional level. This would create a better understanding of how specific regional factors can hinder or foster positive economic impacts of rural development measures on agricultural sectors in the EU.

Key words: *productivity, competitiveness, profitability, support.*

JEL Classification: Q12, Q17, H3, L26

Introduction. Improving competitiveness is one of the key objectives of the rural development programmes in the EU. A large number of studies (e.g. M. Porter, 1990, P. R. Krugmann, 1996, M. Mahony and B. van Ark, 2003, L. Latruffe, 2010 und OECD, 2011) highlight the important role of productivity indicators in the assessment of competitiveness [11, 5, 7, 6]. This interpretation is also reflected in the selection of economic impact indicators in the Common Evaluation and Monitoring Framework (CMEF) of the EU and consequently in the evaluations of impacts of rural development programmes on the competitiveness of agricultural sectors in the EU (EU-Commission, 2006 and 2012) [1, 2]. Particular emphasis is given to labour productivity and gross value added at sectorial level. However, one of the key evaluation challenges is the differentiation between the actual impacts of the rural development programmes on agricultural productivity and the influence of other, regionally different, main drivers and determinants of productivity such as factor endowments, demand conditions and international market and price developments.

The main objectives of the paper are to review the development of productivity indicators of the agricultural sectors in Lithuania and Germany and to discuss the role and potential contributions of the support measures in the Rural Development Programmes.

Methodology. The paper focuses on sectorial productivity and profitability indicators and carries out a comparative statistical analysis with policy support indicators over the period 2000 to 2011. The comparative analysis uses FADN, IACS and Census data as well as data from the national economic statistics services.

German data cover 5 Federal States (Schleswig-Holstein, Mecklenburg Western Pommerania, Lower Saxony, North Rhine Westphalia and Hesse). These are county data which are then aggregated to homogenous economic regions based on the concept developed by H. De. Haen (1979) [4]. Over the 5 Federal States this results in 24 economic regions. The comparison of regional support intensities differentiates between measures in the first and the second axis. The support intensity of axis 1 payments includes all rural development measures under axis 1, while the support

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intensity of axis 2 payments includes agri-environmental measures, forestry payments, LFA payments and animal welfare payments. For Lithuanian family farms the data are aggregated to county level (10 counties in total).

The relative Gross Value Added (GVA) is measured as a ratio of the GVA to Utilized Agricultural Area (UAA) of the different counties in Lithuania. The relative labour productivity of the different regions is measured as a ratio of the GVA to Labour input (FTE) compared to the average ratio of all regions. Relative support intensity is a ratio of the average axes payments per FTE and hectare in a certain region to the average payments per FTE and hectare of all regions in Lithuania and Germany considered in the analysis. Therefore the support intensity is a measure scaled with respect to the national mean.

Different significance and correlation analyses have been carried out to identify and compare potential relationships between the development of the economic impact indicators and support intensities as well as other intervening factors such as structural indicators. This paper reports on the results of the correlation analysis with the Spearman Rank Test.

Literature review. Creation of GVA and labour productivity indicators enables to show the effect of the investment support to modernization [8, 12]. T. Medonos et al, showed the influence of investment support to economic size of farms and to the main economic indicators (income, profit, cost, especially labour costs) [8]. T. Ratinger et al focused on the distribution of the supports and differentiated impacts of the supports according to the production conditions and farm size. The above mention authors showed significant benefits of the investment support in terms of business expansion (represented by Gross value added) and labour productivity improvements [8]. By splitting the sample by natural conditions and by size they demonstrated that benefits are higher on farms in less favoured areas and on medium-size farms in both the absolute and relative terms. However it was determined that there are serious indications that the measure is biased toward large (even very large) farms where the deadweight is rather high. Thus, the measure can be more socially effective and efficient if it is targeted to medium size and small farms. T. Travnikar and L. Juvancic confirmed that higher labour productivity of farms oriented to agricultural production with higher environmental standards (e.g. integrated production). The results have also confirmed the presence of spatial spill over effects [14]. Spatial aspects have impacts on productivity and should therefore not be neglected. K.M. Ortner evaluating of investment support in rural development programmes argued, that profitability depends mostly on changes in the marketplace (supply and demand of tradable goods) and partially on government payments. The effect of investments on GVA is positive but the profitability of the same investment can be positive or negative. Lower producer prices reduce the profitability of an investment but not its effects. In an economic downturn farmers may not invest even if they could collect investment support except, maybe, to get ahead of their competitors. On the other hand, if investments are profitable even in the absence of investment support, farmers will invest and collect support for investments which they would undertake anyway. Thus it is necessity to distinguish gross and net effects; only the latter can be attributed to support payments [10].

The findings of M. Sandbichler show that the farmers pursue multiple objectives with their investments.

The investment projects contribute positively to farmers' satisfaction with quality of life; this applies particularly for labour-intensive dairy farms and for life domains such as work, income and leisure time. It was concluded that the application of QOL-indices significantly broadens understanding of investment processes and recommended integrating such an indicator into future investment project evaluation [13]. Forstner et al. (2009) conclude that the impact of axis 1 measures strongly depends on the regional structural characteristics of the agricultural sector and rural areas [3]. This raises the question to what extent observed changes in productivity and profitability indicators of the regional agricultural sectors are a direct result of the rural development programmes or more driven by other intervening regional factors.

Results. Building on the statistical analysis the potential productivity impacts of the rural development programmes will be discussed in the context of the different main external drivers of the productivity of the agricultural sectors in Lithuania and Germany.

There are large differences between support intensities of 1 and 2 axis payments across German regions. Relatively high support intensities of axis 1 payments and relatively low support intensities of axis 2 payments were observed in intensive livestock regions (e.g. poultry and pigs) such as Emsland and Oldenburg-Mittelweser. Vice versa, high support intensities of axis 2 payments and low support intensities of axis 1 payments are associated with rather extensive and family farming regions with a relatively high share permanent grassland, e.g. in Hesse (Mittel and Südhessen). Roughly a third of the regions have less than average support intensities across both axes. This includes regions with large and small scale farm structures and also large and small shares of permanent grasslands. But the majority of those regions are characterised by farms with small livestock densities.

It was observed large differences between support intensities of 1 and 2 axis payments across Lithuanian counties, too. As for the axis 1 the highest intensity were observed for Taurage (307%) and Utena (101%) counties. Lower intensities were observed for remaining counties. As for the axis 2 the highest intensity were observed for Vilnius (224 %), Alytus (120%), Utena (118%). Again, lower intensities were observed for remaining counties.

The next results show the regional development of GVA and LP (labour productivity) of the agricultural sector. Lithuanian counties were grouped into two groups according change in relative GVA with four counties (Panevėzys, Marijampolė, Siauliai, Kaunas) specific with positive growth rates ranging in between 28 and 5 percent if compared to national average (table 1). Another six counties (Telsiai, Vilnius, Alytus, Utena, Klaipeda, Taurage) experienced negative growth rates ranging in between 42 and 23 percent if compared to national average. Evidently, that counties with a particular positive development faced lower (relative) support intensity. Considering axis 1 relative support intensity, in one county (Taurage) it was three times higher if compared to national average. The explanation is that a regional aspect was ignored.

Therefore only two counties (Taurage and Utena) enjoyed intensity which was higher than national average whereas the rest (eight) of counties received lower (relative) support intensity. Similarly, the axis 2 support was not distributed evenly in terms of relative intensity. For example, Vilnius county was specific witch intensity which was twice as higher as the national average.

Noteworthy, the uneven distribution under axes 1 and 2 was somehow alleviated as counties receiving higher support intensity under either of the axes faced lower intensity under another one (e. g. Vilnius and Taurage featured lower relative support intensities under both axes if compared to either axis 1 or 2 separately).

Table 1

Development of relative GVA of the regional agricultural sectors and support intensities across Lithuanian counties

County	Change in relative GVA/ha 2011/2006	Relative support intensity (per ha) in percent (average 2007-2011), all measures	Relative support intensity (per ha) in percent (average 2007 - 2011), axis 1 measures	Relative support intensity (per ha) in percent (average 2007 - 2011), axis 2 measures
Panevėzys	1,28	0,73	0,77	0,65
Marijampolė	1,14	0,63	0,92	0,16
Siauliai	1,14	0,48	0,53	0,39
Kaunas	1,05	0,45	0,39	0,53
Telsiai	0,87	1,02	0,98	1,07
Vilnius	0,70	1,45	0,97	2,24
Alytus	0,64	0,84	0,61	1,20
Utena	0,61	1,08	1,01	1,18
Klaipeda	0,60	0,68	0,70	0,63
Taurage	0,58	2,04	3,07	0,48
Positive group, n = 4	1,15	0,57	0,65	0,43
Negative group, n = 6	0,67	1,18	1,22	1,13

Source: Own calculations.

Table 2

Development of relative labour productivity of the regional agricultural sectors and support intensities Lithuania

Region	Change in relative Labour Productivity 2011/2006	Relative support intensity (per FTE) in percent (average 2007 - 2011), all measures	Relative support intensity (per FTE) in percent (average 2007 - 2011), axis 1 measures	Relative support intensity (per FTE) in percent (average 2007 - 2011), axis 2 measures
Vilnius	1,56	1,54	1,03	2,38
Utena	1,29	1,44	1,35	1,58
Telsiai	1,19	1,15	1,11	1,22
Marijampolė	1,05	0,93	1,36	0,23
Panevėzys	1,03	0,78	0,83	0,70
Klaipeda	1,00	1,05	1,08	0,97
Siauliai	0,99	0,55	0,61	0,45
Kaunas	0,87	0,58	0,50	0,69
Taurage	0,70	0,87	1,32	0,20
Alytus	0,33	1,20	0,61	1,73
Positive group, n = 5	1,22	1,17	1,14	1,22
Negative group, n = 5	0,78	0,85	0,82	0,81

Source: Own calculations.

As it was the case with relative GVA per UAA hectare, Lithuanian counties are grouped into two groups according change in relative labour productivity with five counties (Vilnius, Utena, Telsiai, Marijampolė, Panevėzys) specific with positive growth rates ranging in between 56 and 3 percent if compared to national average. The remaining five counties (Klaipeda, Siauliai, Kaunas, Taurage, Alytus) experienced negative growth rates ranging in between 67 and almost nil percent if compared to national average. Contrary, to the findings regarding relative GVA (table 2), counties with particular positive development, faced higher (relative) support intensity.

Considering axis 1 relative support intensity (per FTE), with six counties (Vilnius, Utena, Telsiai, Marijampolė, Klaipeda, Taurage), specific with positive growth rates ranging in between 36 and 3 percent if compared to national average. Therefore only four counties (Siauliai, Kaunas, Alytus, Panevėzys) received lower (relative) support intensity. Similarly, the Axis 2 support was not distributed evenly in terms of relative intensity. For example, Vilnius county was specific witch intensity which was twice as higher as the national average. Noteworthy, counties with a particular positive relative labour productivity faced higher (relative) support intensity.

Table 3

Development of relative labour productivity of the regional agricultural sectors and support intensities in Germany

Region	Change in relative GVA 2011/2006	Change in relative Labour Productivity 2011/2006	Relative support intensity (per FTE) in percent (average 2007 - 2011), all measures	Relative support intensity (per FTE) in percent (average 2007 - 2011), axis 1 measures	Relative support intensity (per FTE) in percent (average 2007 - 2011), axis 2 measures
West- and Nordhessen	1,17	1,30	107,93	58,99	161,49
Südwestmecklenburg	1,28	1,27	327,59	328,56	334,73
Münsterland	1,15	1,25	35,01	38,91	30,25
Nordmeckl., vorp. Küstengebiete	1,28	1,21	157,55	182,13	134,51
Ostmecklenburg, Ostvorpommern	1,24	1,20	44,29	44,20	47,65
Osthessen	1,08	1,18	126,76	49,44	211,86
Leinebergland	1,06	1,17	89,92	85,53	93,83
Nordwestmecklenburg	1,17	1,16	128,36	185,18	68,37
Sauerland	1,18	1,16	147,05	42,04	262,91
Hellweg-Börde, Südostwestfalen	1,03	1,14	58,38	20,80	99,79
Rhein.Westf. Industriegebiet	1,00	1,10	18,65	12,95	24,81
Mittel- and Südhessen	1,03	1,07	60,18	35,07	87,60
Niederrhein	0,84	0,88	35,12	33,36	36,69
Ostheide	0,92	0,88	115,60	124,70	104,12
Emsland	1,02	0,87	115,63	188,86	32,38
SH-Geest	0,96	0,86	24,19	18,36	30,44
Köln-Aachener Bucht	0,81	0,86	63,35	25,28	105,24
SH-Hügelland	0,99	0,86	174,18	234,57	104,64
Bergisches Land	0,79	0,85	54,65	17,56	95,53
SH-Marsch	0,96	0,85	35,87	26,48	45,98
Flußauen and Heidegebiete	0,94	0,85	135,56	160,48	106,16
Oldenburg-Mittelweser	0,92	0,82	95,94	147,16	37,54
Braunschweig-Hildesheimer Lössbörde	0,91	0,81	82,67	93,57	69,55
Nordseemarchsen and -Geesten	0,89	0,75	165,58	245,81	73,92
Positive group, n = 12 (mean/average)	1.16/1.14	1.17/1.18	98.93/108.	46.82/102	96.81/130
Negative group, n = 12 mean/average)	0,92/0.91	0,85/0.85	89.31/91.5	109.14/109	71.74/70.2

Source: Own calculations.

Of the 24 German regions considered in the analysis, half of the regions show above average grows rates of labour productivity in the agricultural sectors. The highest growth rates can be found in regions in the North-East of Germany with significant structural change taking place over the last decades and intensive livestock regions in North-Rhine Westphalia. Interestingly, also the Sauerland, an extensive upland region with a large share of permanent grassland, shows above average development of labour productivity. Many dairy and arable regions show a below average development of labour productivity in northern Germany. Regional agricultural sector with an above average development of labour productivity have on average higher support intensities, if both axis 1 and 2 payments are considered, but have lower support intensities of axis 1 payments (which aim at increasing labour productivity) and higher support intensities of axis 2 payments such as agri-environmental payments. The mean support intensity of axis 1 payments of regions with above average developments of labour productivity is roughly half of the mean of axis 1 support intensities for regions with below than average developments.

To further examine the relationship between the development of labour productivity and support intensities, correlation and significance tests have been carried out. The results of the Spearman Rang test indicate only a small correlation (rs = 0,39) between changes in the relative labour productivity and support intensities of axis 1 payments. But the result is just outside the defined significance limit (p = 0.0545) and only shows a slight trend towards a linkage between changes in labour productivity and support intensities of axis 1 payments. Coefficients for correlations with axis 2payments and between changes in relative GVA and support intensities are very small. Generally, the results show no clear mono causal linkage between changes in the economic impact indicators and the support intensities. Instead stronger linkages with other factors influencing competitiveness (e.g. farm size and factor prices) can be identified. Table 4 reports the results of the county level analysis of correlations between changes in relative productivity between 2006 and 2011 and structural characteristics of agriculture at county level in Germany. Analysis carried out at the level of economic regions has confirmed the results at county level.

Table 4

Change in relative labour productivity and structural indicators at county level in Germany

Structural indicators	Change in relative labour productivity	
	Correlation coefficient	Significance
Relative farm size in ha and change in relative labour productivity	**0,5421**	**0,000007**
Relative number of LU per farm and change in relative labour productivity	0,0957	0,242348
Relative share of farms with more than 100 LU and change in relative labour productivity	0,0714	0,316322
Relative land rental prices and change in relative labour productivity	**-0,2666**	**0,001237**

Source: Own calculations.

Correlation coefficients suggest stronger linkages between performance of sectorial economic indicators such as labour productivity and structural indicators, in particular land rental prices and farm size highlighted in bold. This suggests that the impact of RDP funding on sectorial economic development is rather limited and other factors play a much bigger role.

Conclusions

1. On a per hectare UAA and FTE basis only one region in Lithuania and very few regions in Germany have above-average support intensities of 1 and 2 axes payments, while a larger number of regions in both countries have below average support intensities of both axes. Regions with below average developments of sectorial GVA receive higher support intensities of axis 1 payments.

2. The results suggest that specific regional determinants such as agricultural structures (e.g. farm size and land rental prices) and network and market structures have bigger impacts on the development of the sectorial competitiveness and substantially influence the causal relationships between RDP funding and sectorial development. The indicated importance of structural indicators suggests that the economic performance and impacts of rural development programmes strongly depends on regional structural characteristics and factors of agricultural sectors and positive impact on regional agricultural sectors are only generated if other drivers and characteristics of sectorial competitiveness are in a favourable state. But it has to be emphasised that possible long term impacts of the rural development programmes could not be included in the analysis at this stage.

3. Further case study analysis is required to examine the specific causal relationships between the main determinants of competitiveness and RDPs at regional level. This would create a better understanding of how specific regional factors can hinder or foster positive impacts of RD measures on the sectorial development.

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