



Dynamics in the Agricultural Sectors of the Baltic States: the Effects of the Common Agricultural Policy and Challenges for the Future

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ABSTRACT

Sustainable agriculture is the basis for long-term economic growth ensuring employment for the rural population. The aim of this research is to assess the dynamics in agricultural output, investments, direct payments and energy use in Estonia, Latvia and Lithuania under the Common Agricultural Policy (CAP) during 2008-2017. The method of research is the evaluation of production factors generated by agriculture and related activities carried out by the model of the EAA system. The performance of the agricultural holdings is measured using economic indicators: output of the agricultural 'industry', gross fixed capital formation (GFCF), direct payments, return on capital, total labour force input, average farm income. We discuss the trends in absolute and relative indicators relates to different aspects of the sustainable agricultural development to identify the key priorities of the CAP in the Baltic States which are new European Union Member States. The results indicate that in Estonia, Latvia and Lithuania EU support has affected investments in capital. The amount of GFCF over ten years annually grew an average by 0.1% in Estonia, by 8% in Latvia and by 17% in Lithuania which has led to increase productivity on farms, positively influenced growth on output agriculture and income as well. During the period 2008-2017 marked growth in the agricultural output levels and direct payments on average annually by more than 4% and 5-6%, respectively. These induced higher capital investments which require reasonable revision of the CAP measures in order to avoid overinvestment and address changes in the global agricultural markets.

INTRODUCTION

The EU comprises a number of Member States with different levels of development. As regards the new EU Member States, they often face less competitive agriculture due to insufficient use of intermediate inputs and experiencing low price recovery ratios. Development of the EU agricultural highly depends on the CAP. This is especially the case in the new EU Member States as CAP payments account for relatively high income share there. The CAP is a comprehensive policy managed at EU level. The CAP aims to maintain sustainable and diversified agriculture across the EU, to provide consumers with affordable food at reasonable prices and to ensure appropriate standard of living for EU farmers'. Both the global agricultural markets and the CAP are constantly evolving. Thus, one needs to analyse the key trends in agriculture and society in order to coordinate the economic policies of the Member States in the best possible way. In addition, agricultural direct payments account for significant part of the EU budget for agriculture and rural development, and will remain a crucial part of the CAP in the future. The new system of direct payments must ensure and stabilize the farmer's income from the sale of agricultural products on the market. In order to increase farm profits, farmers were encouraged to respond to market developments changes, produce goods according to consumers needs, together with proper management of agricultural land, appropriately in line with environmental, animal welfare and food safety standards. Each measure under the CAP should be monitored and evaluated to ensure its effectiveness in terms of the following indicators: economic viability; income generation; structure of agricultural production and intermediate consumption.

For that purpose, the EAA provides a set of comparable data that allows access to the results of the whole agricultural sector and the assessment sustainability of the farmer's farms. The EAA are a satellite account of the European System of Accounts. They cover the agricultural products and services produced over the accounting period that are sold by agricultural units, held in stocks on farms, or used for further processing by agricultural producers. EAA data can be used to calculate income indicators for the agricultural sector.

Besides economic performance, the other facets of agricultural activities also need to be taken into consideration. The concept of sustainability can be applied in this instance to assessment of agricultural sectors in the Baltic States. In the literature (Diazabakana et al., 2016), sustainability indicators are widely discussed, but until now no unified concept of sustainability has been adopted, and this shows that more research is needed. Considering the economic dimension of sustainability, the renewal of existing capital goods and investments into new ones provides an important indicator of business viability. Furthermore, the dynamics in the labour force are associated with the social dimension of sustainability. Thus, agricultural activities and the labour force there are important not only in economic sense, but also for sustainable rural development in general. The system of CAP payments impacts all of the aforementioned dimensions of sustainability as well as the environmental one through environmental payments and associated regulations (Bertoni et al., 2018).

The Baltic States entered the EU in 2004 and became subject to the CAP. The support payments under the CAP allowed modernizing the agricultural sectors of the Baltic States, yet there are still differences in productivity and income levels among those countries and the old EU Member States. What is more, ageing or the rural population is evident. This study aims to identify the key challenges for the agricultural sectors of the Baltic States operating under the CAP in the context of the sustainable development goals. The research questions addressed are whether the Baltic States have improved sustainability of their agricultural sectors following the accession to the EU and what are the major challenges for further development. Also, we test for convergence among the Baltic States in their agricultural development (Niavis and Vlontzos, 2019).

The paper proceeds as follows. Section 2 reviews the issues in agricultural sustainability and the role of the EAA for tracking progress towards development of sustainable agriculture. Section 3 discusses data used. Section 4 presents the results.

1. THEORETICAL BACKGROUND

Membership in the EU has given the opportunity for agricultural producers to use the EU support which led to faster economic growth and further development of well-being in rural areas. According to the author, the most important sources of these changes are the CAP and structural funds (Wigier, 2014; Hlavsa et al., 2017). The CAP instruments are covering support for agriculture which resulted in growth the income of farms', and structural funds have increased the investment for the modernization of agriculture and food sectors and for the development of rural areas. To provide comparable indicators on the level of agricultural production that significantly increased during the period considered between all EU countries we used data of EAA (Czyżewski et al., 2015) and it is noted that specialized farms increase farm efficiency but can influence in the quality of food and use of natural resources in rural areas. As noted in the literature (Namiotko et al., 2019; Zsarnóczai et al., 2019; Střeleček et al., 2009), agricultural productivity growth in farmers' farms is related with higher investments, also the subsidies on production were focused on new technology, to increase consumption of fixed capital. It is noted that value of agricultural output has been significantly increased in Estonian, Latvian and Lithuanian farms, but despite these changes did not achieved those in the developed countries. Various studies have shown that the indicators can be defined as in various ways in assessing the impact of farm support programs and productivity as well (Novotna, 2016). As investment support in main new capital is one of the factors of competitiveness, and which may have a longer-term impact on productivity and resilience of farms in terms of competitive environment.

When carrying out investigation the impact of investment in the context of support, the many authors found that (Kollár, 2015; Krisciukaitienė, 2011; Ratinger, 2013) increase in long term assets and support have effect on the production volume and productivity therefore contribute to competitiveness also have positive on the efficiency of farmers farms. However, it is stressed that bigger farms have possibility better access support than smaller farmers farms. The authors' analysis revealed that the most support is received by larger farms than smaller. It was concluded that farmers, receiving support, were ready to expand farms. Order to investigate differences in investment support impacts analysed their relationship by size groups of farms and their types of farming and pointed that the number of projects are taken under the RDP is related with the size of farms. (Ratinger 2013; Czyżewski et al., 2015). Finally, they concluded that support for investment became a key tool for agricultural policy.

Issues relating to the definition of EAA, methods of calculation, fields of use and value are addressed in detail by many authors. When carrying out an economic analysis between EU countries, the authors use a many number of factual data on the basis economic accounts of agricultural, according to which their differences and similarities are assessed. (Zsarnóczai et al., 2019; Reiff et al., 2018; Spicka et al., 2017). The authors said that the main objective of agricultural support was that producers could have increased the accumulation of their farm capital through the development technology of production and the ability to compete successfully in the market, so as to obtain sufficient income for the survival in a competitive environment and important effect of investment, while also for economic growth.

Some theoretical studies suggest that in order to improve the productivity of the economy and to assess of agricultural sustainability of farmers farms, the focus should be on the choice a set of indicators. (Gaviglio et al., 2017) The main aim, the increased demand for information on the sustainability of agricultural production, in order to measure, analyse, need select a group of useful indicators that are used for further planning and management at farm level in the long term. According to authors, it is proposed to be divided a groups of indicators into environmental, economic, social, which related with farming. As agriculture contributes to quality of life in rural areas, it is important to select such main indicators in the assessment of the sustainability process in agriculture activity (Herrera et al., 2016). After analysis the effects of different kinds of sustainability indi-

cators, concluded that all indicators are perceived as useful and considered feasible to measure at the farm level. As underlined by Latruffe et al. (2016), developments of the farms economics may lead the factors such as output and input prices, yields, output sales, support and regulation, social-related employment and quality of rural areas. And focus on environmental protection, promoting more efficient use of natural resources and resilience of farmers. In the future, indicators of sustainability need to be developed to measure economic performance as profitability, productivity, and social as well. Knowledge can be considered as one of the elements of the social dimension of sustainability (Bjerke 2016). The impact of knowledge can be identified by involving quantitative measures of knowledge (human capital) into analysis of productivity.

On the other hand, (Van Cauwenbergh et al., 2007) observed that economic sustainability indicators, such as capital costs and operating costs are considered as key indicators of farmers farms for the survival over time. According to the results of the survey (Sulewski, et al. 2018), authors tried to assess between the sustainability dimensions at the farm level and noted that the simple correlation analysis revealed that medium values of the sustainability indices are usually quite strongly connected with each other, but achieving a high level of sustainability in all aspects is relatively difficult at the same time.

In this paper, we confine ourselves to the major economic, social and environmental indicators representing performance of the agricultural sectors of the Baltic States. The economic activities are represented by such indicators as the total output and direct payments. The social dimension is represented by the labour force used in agriculture. The environmental dimension is indirectly represented by the energy use.

2. METHODOLOGICAL APPROACH

In order to assess the development of the economic and structural agricultural activity of the member states of the EU, a unified system of EAA was established. The Integrated System of Economic Accounts provides a systematic, comparable overview of agricultural economic activities among EU member states, which is used to analyze, forecast and measure agricultural economic activity. The method of research is the evaluation of production factors generated by agriculture and related activities carried out by the model of the EAA system which in the calculation, involves the use compatibility of different data sources. The agricultural sector compared with other economics sectors has some special characteristics, that describing in Estonian, Latvian and Lithuanian agriculture are still dominated by small farms, significant share of the number of employments and there are big differences in income between other economics sectors. For the purpose of this study, the performance of the agricultural holdings is measured using as indicators output of the agricultural 'industry' and GFCF, direct payments, return on capital, total labour force input, average farm income is chosen as well. In order to estimate the growth of gross output production, as indicator the output of the agricultural 'industry' is chosen. The prices of current year are applied. The direct payments include EU CAP and national aid. For European farmers, direct payments are one of the most important sources of income. Direct payments helped to even out the variability in EU farm income. The total value of the gross fixed capital formation (GFCF) is expressed how much are investments in agricultural activity and is defined as follows: In order to evaluate return on capital, we divide the value of output of the agricultural industry by gross fixed capital formation. This indicator shows the value of the agricultural output created relative to capital investment in corresponding year (hence, it is not completely accurate in measuring capital productivity). It indirectly shows how quickly invested capital and management quality pay off. The indicator shows how farmers manage capital for income generation and the relative weight of capital in the value of agricultural production.

Energy use is important in several regards. First, it is an input for agricultural production. As it is the case with any other input, the efficient use of energy allows for cost reduction. Second, the

use of fossil energy is related to environmental pressures (e.g. greenhouse gas emissions). Thus, accounting for the energy intensity changes is important for agriculture as well as for the other economic sectors. We consider the final energy consumption in agriculture to track the energy intensity. The analysis covers the period of 2008-2017. This allows identifying the major trends prevailing in the agricultural sectors of the three Baltic States. Note that the time period covered includes the economic recession in 2009 and the effects of Russian embargo in 2014.

3. RESULTS AND FINDINGS

3.1. Efficiency of agricultural production in Estonia, Lithuania and Latvia

In order to evaluate the development trends of agricultural activity, efficiency and impact of EU support on the rural development of Estonia, Latvia and Lithuania, we used selected indicators which allow a comparison of progress among countries during the program period in 2008-2017. The main indicator describing the economic development of farms' in general is the gross agricultural production. It defines the country's economic growth, describes the standard of living, and is also used to assess the structure of the economy, to carry out comparative analysis of economic development in different countries.

In 2017, the value of the output produced by agricultural industry was estimated EUR 0.9 billion in Estonia, EUR 1.4 billion in Latvia and EUR 2.8 billion in Lithuania. Over the period from 2008 to 2017 the agricultural output increased by 88% in Estonia, 38% in Latvia, 32% in Lithuania. When analysing the situation in Estonia, Latvia and Lithuania the main changes in value of agricultural output was linked to the performance of the direct payments which increased the farms' income. Furthermore, the comparability of these results over time is affected by changes in producer prices and plus a slight increase in volume production as well. Calculations shows that output of the agricultural industry on average annually increased by more than 4% in Estonia, Latvia and Lithuania over ten years, that influenced the positive growth in farm income and productivity.

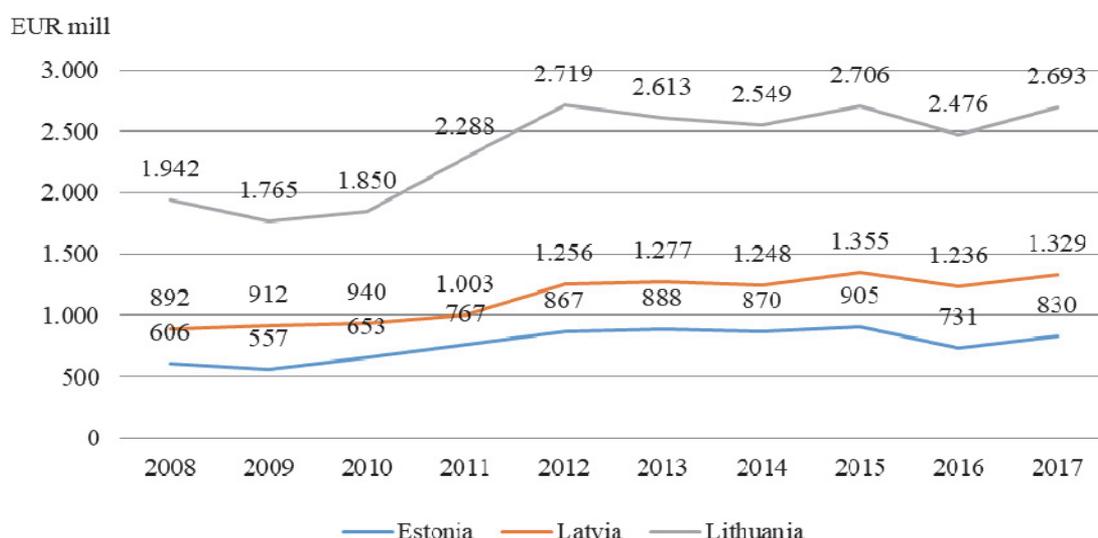


Figure 1. Output value of the agricultural 'industry' in 2008-2017 at current prices, (chain linked volumes, previous year), EUR mill

Source: Eurostat

If we compare the figures by country, we can perceive the same tendencies. Noticeable, the output of the agricultural industry at producer prices is on a rising trend since 2004 to 2017, and reach by 1.9 times in Estonia, 2.2 times in Latvia and by 2.3 times in Lithuania. By the way, in these countries the output of the agricultural industry increased almost completely the same. In the comparative analysis of the results, it is important to link the relative change of the relevant indicator with the other indicators. It is therefore important to look at the structure and composition of the value of this agricultural production, the various inputs, the direct payments indicator have been chosen and examined.

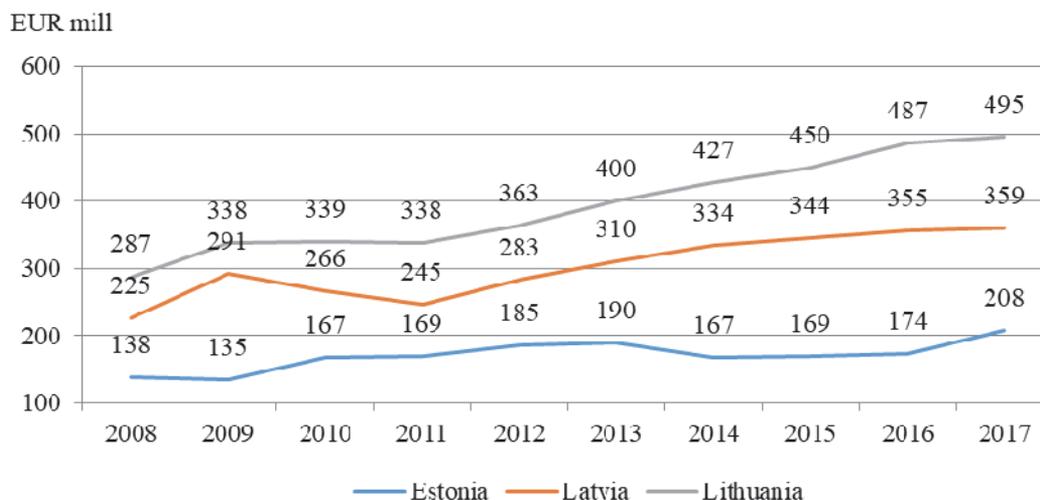


Figure 2. Value of direct payments in 2008-2017, (chain linked volumes, previous year), EUR mill

Source: Eurostat

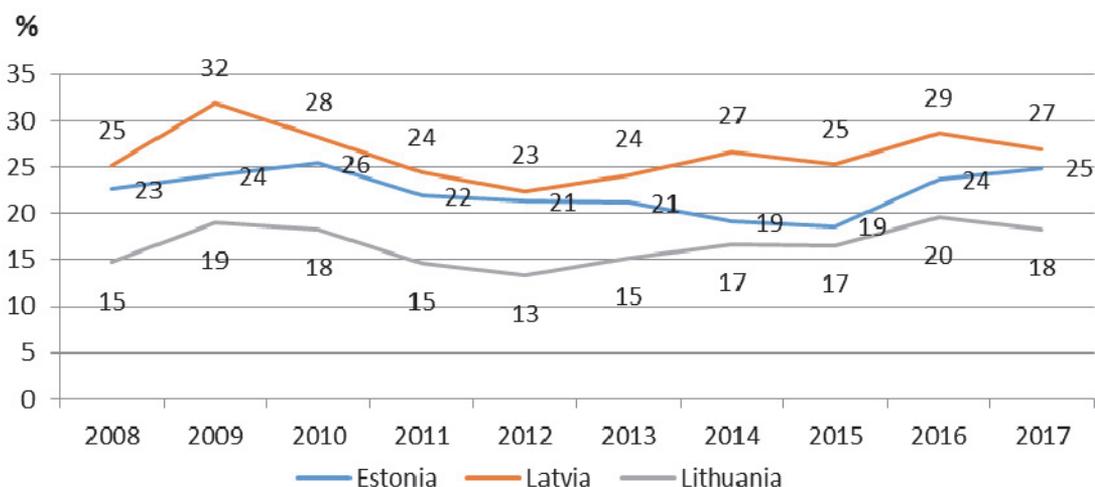


Figure 3. Share of direct payments in value output of the agricultural 'industry' in 2008-2017, (chain linked volumes, previous year),%

Source: Eurostat

The factor determining income developments of farms' was direct payments. The value of all agricultural subsidies (product subsidies and other production subsidies) recorded in 2017 amounted to € 208 million in Estonia, € 359 million in Latvia, € 495 mill in Lithuania. Direct payment in Estonia, Latvia and Lithuania has gone up over the period after accession to the EU in 2004. It means that the amount of direct payment over ten years annually grew an average by 5-6% in Estonian, Latvian and Lithuanian of farms', and the income also grew up during the period which joined the EU in 2004. In terms of the total value of direct payments paid to agricultural producers increased 2.8 times in Estonia, 2.6 times in Latvia and 2.9 times in Lithuania during period between 2004 and 2017. The levels of variability in farmers' farms income still depends on these direct payments. This is one of the main measures of Estonian, Latvian and Lithuanian farms' implementing the European Union's CAP, agriculture and rural policy. The type of subsidies has changed over time in order to equalize distribution of direct payments for farms.

In the case of Estonian, Latvian and Lithuanian farms, the share of direct payments in value of output of the agricultural 'industry', had an important and positive impact for contribution to keeping sustainable farming

The operational efficiency of the agricultural industry can be measured in terms of GFCF. The indicator of GFCF in agriculture reflects the trend that was influenced by the implementation, achievements and performance of the CAP. GFCF measures show how much of the value added created by agriculture is invested rather than consumed and is, therefore, a key element for understanding future competitiveness in the agricultural sector. The GFCF is main crucial factor determining of the farm viability and income developments.

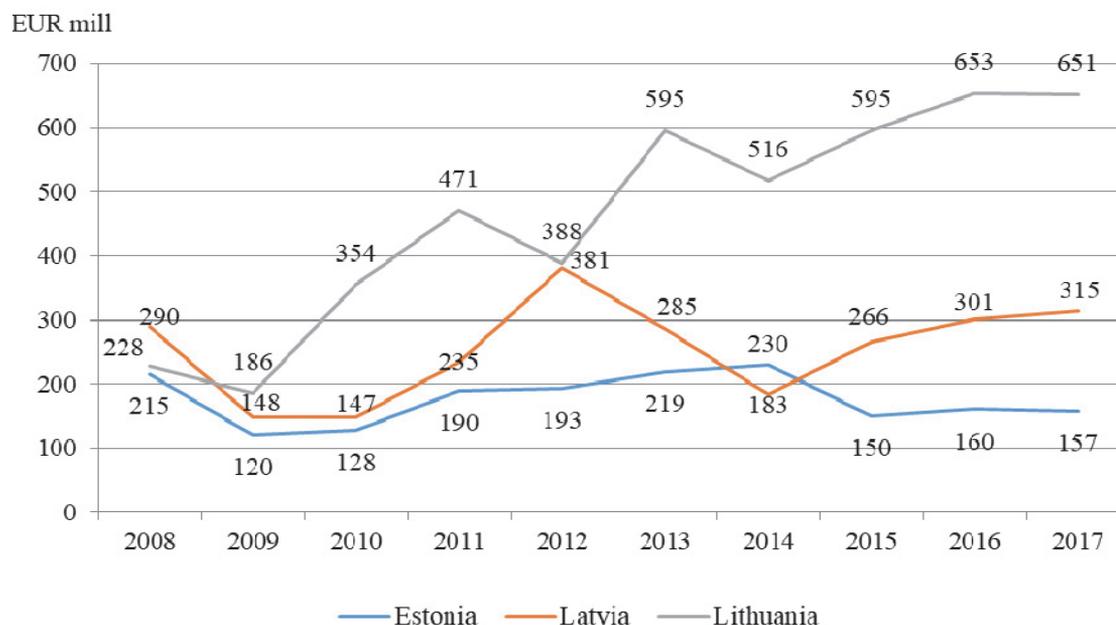


Figure 4. Gross fixed capital formation in 2008-2017, (chain linked volumes, previous year), EUR mill

Source: Eurostat

The analysis of GFCF in Estonian Latvian and Lithuanian farms shows that investment during the period in 2008–2017 was different. However, the total value of capital increased by 0.5 % in Latvia and 3 times in Lithuania, however, in Estonian farms have decreased by 29% during the

period between 2008 and 2017. When comparing the capital in Estonia, Latvia and Lithuania has gone up and down over the last decade, as illustrated by results of indicator GFCF. The graph also shows that results in all countries are different. The agricultural sector in Estonia invested EUR 163 mill in 2017, and the amount of GFCF over ten years annually grew an average by 0.4% and the share GFCF from output of agricultural was 19%. Different situation in Latvia invested EUR 325 mill in 2017. In fact, the amount of GFCF over ten years annually grew an average by 9%. (accounting for 24% of output). The large investment was made in Lithuania and amounted to EUR 679 mill in 2017, or annually grew an average by 17% during the period from 2008 to 2017, respectively.

The highest investments in Estonia was 2008 (EUR 231mill) and 2014 (EUR 237 mill). Meanwhile in Latvia was 2012 (EUR 400 mill) and 2017 (EUR 325 mill). The same situation was in Lithuania – 2013 (EUR 603 mill) and 2017 (EUR 679 mill). This can be explained the falling or increasing in value of GFCF during this period and was mainly due to programme RDP. While in 2012 showed significantly higher invested capital than others years in Latvia. In Lithuania, value of capital investments grew annually, interrupted with a significant drop in 2012 and in 2014, then significant growth, due to the new programming period in 2015-2017 as in Latvia. In spite of the growing investments in the agricultural sector, it is important to estimate the return on capital, i.e. the value of agricultural production produced per one EUR of the capital, in the farmers' farms. The indicator illustrates the return of capital funds which are invested in the main farms' economic activity. The farms were benefiting from the rural development programme (RDP) for 2007-2013 measures have been rapidly modernised. The investment in the active capital increased from 2008 until 2011 and then decreased in 2011-2012 in Latvia. The same situation in Lithuania when increased from 2004 to 2011 and then decreased. The beginning of the new programming period for 2014-2020 marked increasing investments in Latvia and Lithuania. Meanwhile in Estonia, the growth of the investment in the active capital was stable. During the new period of the RDP, the process of modernization of farms' has reactivated again. Despite growing or decreasing investments during the period, the return on capital (agricultural output value of one GFCF) was reduced in 2008 and 2014 compared to 2004 in Estonia, 2012, 2016 in Latvia, 2013, 2017 in Lithuania, respectively.

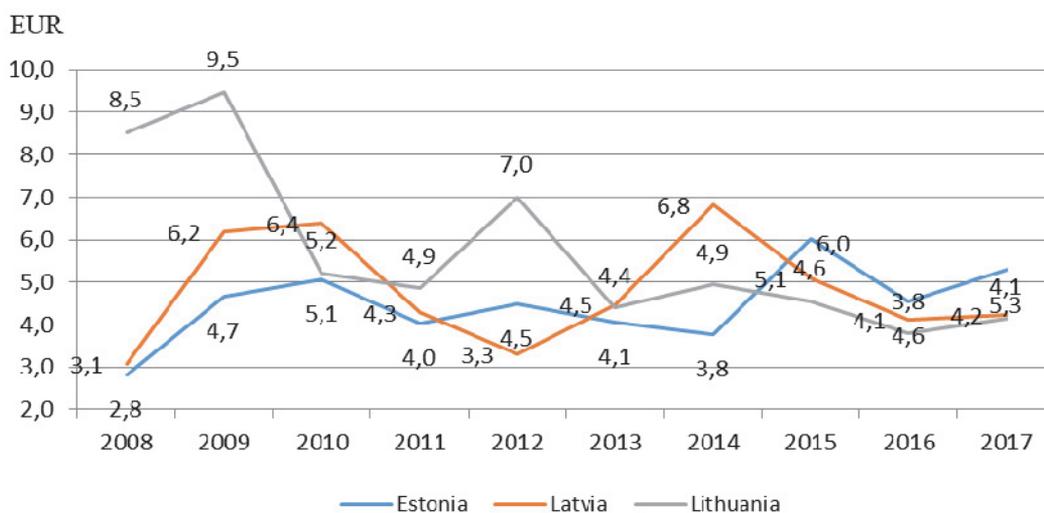


Figure 5. The value of agricultural production produced per one EUR of the GFCF in 2008-2017 (chain linked volumes, previous year), EUR

Source: Eurostat, chain linked volumes, previous year, million euro

Overall this shows that volume of production in Estonian, Lithuanian and Latvian farmers' farms in 2008-2017 did not satisfy the technical and applicable technology capacity, i.e. the efficiency of the funds invested in fixed tangible productive assets was not high (according to the rate of return on capital). Labour force input in the agriculture is the main component used in calculating indicator assessment of capital changes. For the production of output requires two inputs: labour and capital. The relationship between growing volume of capitals to farmers farms reduces number of employees.

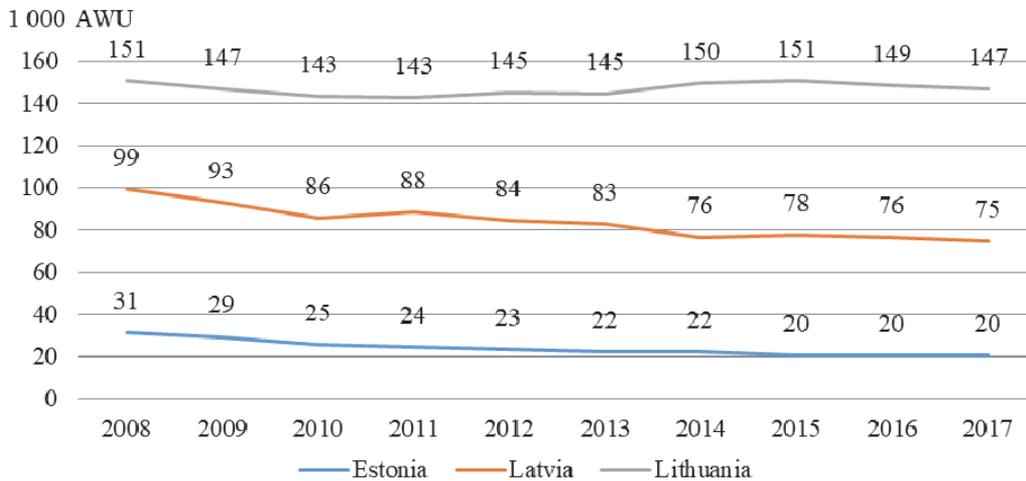


Figure 6. Total labour force input (total employment in agriculture) in 2008-2017

Source: Eurostat

Over the period 2004 to 2017, agricultural labour input fell by 50% in Latvia, by 47% in Estonia, and by 11% in Lithuania. However, analysing of the period, it is noticeable that the number of employees has been decreasing and latter it was growing again. This shows the level modernization of farms, increasing labour productivity and more flexibility in organizing work.

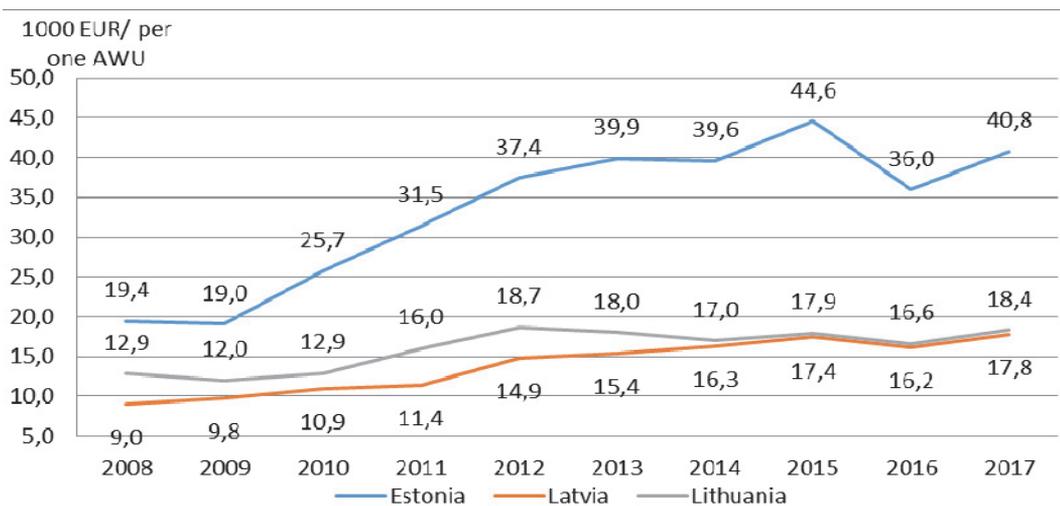


Figure 7. Labour productivity in 2008-2017

Source: Eurostat, chain linked volumes, previous year, million euro.

The changes in energy consumption in the agricultural sectors of the Baltic States are depicted in Fig. 8. The differences in the average level of the energy consumption are not that evident among the three Baltic States. This indicates that there exist serious differences in terms of the energy intensity as countries with different levels of output show similar levels of energy consumption. Even though Lithuania produces the largest agricultural output, its energy consumption level became the lowest one in 2013. Therefore, energy efficiency improvements are topical for Estonia and Latvia.

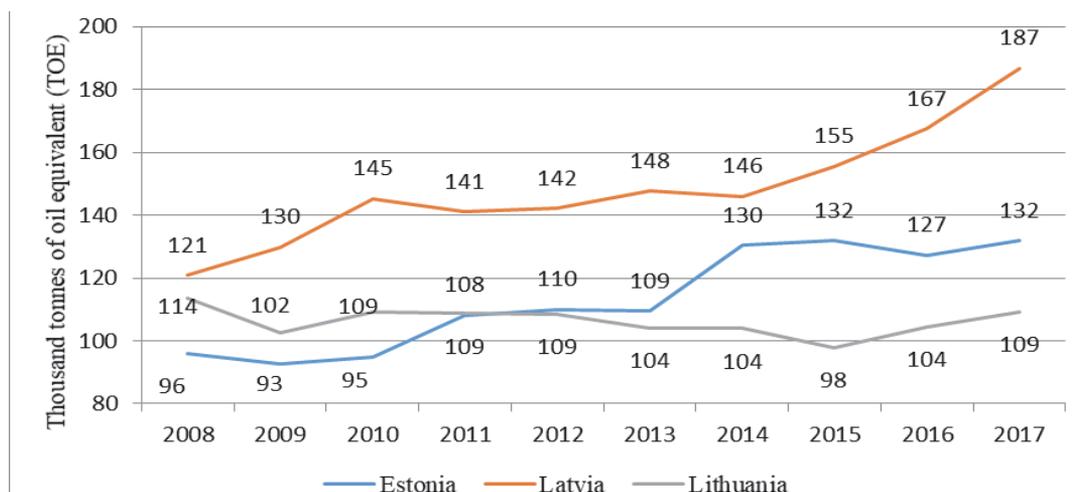


Figure 8. Dynamics in the energy consumption in the agriculture of the Baltic States, 2008-2017

Source: Eurostat

Table 1 presents the main indicators which describe the changes in selected indicators for the Baltic States during 2008-2017. The highest growth rates for output value of the agricultural industry, direct payments and GFCF were achieved in Lithuania and Latvia, but in Estonia as regards these indicators were lower. Thus, higher labour productivity gains were observed in Estonia and Latvia.

Table 1. Stochastic rates of growth and trends for the coefficients of variation

| Indicator | Growth rate | | | Trend for CV |
|---|-------------|--------|-----------|--------------|
| | Estonia | Latvia | Lithuania | |
| Output value of the agricultural industry | 4.1 | 5.0 | 4.5 | 0.01 |
| Direct payments | 3.3 | 4.8 | 5.9 | 1.03 |
| Gross fixed capital formation | 0.4 | 4.6 | 13.1 | 5.26 |
| Labour force | -4.8 | -3.0 | 0.1 | 1.79 |
| Labour productivity | 8.9 | 7.9 | 4.4 | 1.63 |
| Direct payments/Output | -0.8 | -0.2 | 1.3 | -0.64 |
| Energy consumption | 4.4 | 3.7 | -0.6 | 1.21 |
| Energy intensity | 0.5 | -1.2 | -4.9 | 1.55 |

Source: Eurostat

The negative trends were observed for output and the ratio of direct payments to the output for the Baltic States. This implies these countries became more similar in regards to these values. As regards the output, the trend coefficient is close to zero. This suggests Latvia and Estonia approached the scale of Lithuanian agricultural output to a certain extent over 2008-2017. The convergence in relative direct payment rate was observed as Lithuania approached the other Baltic States (note that slightly negative stochastic growth rates are observed for Latvia and Estonia). As regards the absolute value of the direct payments, the convergence did not occur as the positive trend was observed for the corresponding CV. This suggests that dynamics in the amount of the direct payments do not correspond to the dynamics in the agricultural output to a full extent thus creating the aforementioned misalignments in the rates of growth.

The largest divergence among the three Baltic States is observed for the gross fixed capital formation. Indeed, Lithuania showed the highest stochastic rate of growth if opposed to the other Baltic States. This suggests that excessive investments may create inefficient agricultural sector in Lithuania. Effects of the depopulation of the rural areas are evident for all the countries considered as the labour force declined or showed negligible stochastic rates of growth. The countries remained divergent in terms of the agricultural labour force. Given the trends in agricultural output and labour force, the labour productivity of the three Baltic States did not converge during 2008-2017. This implies the differences in competitiveness and farm income.

The dynamics in energy consumption and energy intensity indicate further room for improvements in farm sustainability. Especially, Estonia showed the highest rates of growth in the latter two indicators related to energy input. This is obviously influenced by fossil fuel (oil shale) availability in Estonia. Latvia showed an increase in the absolute energy consumption, yet energy intensity followed a downward trend. However, the recent increase in the energy consumption reversed this trend for Latvia and Estonia. All in all, energy efficiency remains an important issue for agriculture of the Baltic States, especially for Estonia and Latvia. What is more, the coefficients of variation suggest an increasing gap among the Baltic States in regards to the energy performance indicators for agriculture.

CONCLUSIONS

The aim of the article is to identify and quantify the factors that determine the changes in value of agricultural output generated in agriculture in the period 2008-2017. Sustainable development of agriculture is an important aspect of the economic development for all EU countries. In summary, sustainable development consists of equivalent components, such as environmental protection, economic, social development. Assessment of the agricultural sector in Estonia, Latvia and Lithuania has been chosen in one aspect using economic indicators: agricultural output, direct payment, GFCF and return on capital. The EU support has affected investments in capital, which has led to increase productivity on farms, positively influenced growth on output agriculture and income as well. Over the period from 2008 to 2017 the agricultural output increased by 38% in Latvia, 32% in Lithuania and in Estonia (these results were affected by changes in producers prices and production volume).

The total value of capital increased by 0.5 % in Latvia and 3 times in Lithuania, but in Estonia decrease 30%. The total value of direct payments paid to agricultural producers increased 2.8 times in Estonia, 2.5 times in Latvia and 3 times in Lithuania during the period 2004 and 2017. The return on capital was reduced in 2008, 2014 compared to 2004 in Estonia, 2012, 2017 in Latvia, and 2013, 2017 in Lithuania respectively. Over the analysing period agricultural labour input fell by 50 % in Latvia, and 47 % in Estonia, 11% in Lithuania. This shows that, the growth of capital volume created conditions for decreasing the number of employees in farms. It can be concluded, that GFCF in the agricultural sector could be used more efficiently. In addition, these

changes in the return on capital can be explained that resulted from changing in prices of agricultural products and weather conditions. The contribution of investment and direct support on the main capital has a positive effect, that the farming sector is competitive and dynamic, attractive for young farmers. Thus, CAP support for farmers, including direct payments, remains important to ensure the sustainability of the EU farm sector and rural areas in economic, environmental and social terms.

The results indicate growth in the output of the agricultural sectors of the Baltic States during the period of 2008-2017. However, the growth in output also requires adjustment in its structure in order to ensure the sustainability of the agricultural sectors. Specifically, the increasing agricultural production (especially cereals) in Russia, Ukraine and Kazakhstan (OECD/FAO, 2018) requires structural changes in the Baltic States. Specifically, the production shift towards crop production has been partially induced by the CAP (which has particularly strong effect in the new EU Member States; see Neuenfeldt et al., 2019) in the Baltic States may result in less competitive agriculture there. The results also indicate the increasing importance of the direct payments in Lithuania. In order to ensure economic viability of the agricultural sector in the Baltic States, both productivity gains and improvements in price recovery are needed (Czyżewski et al., 2019). This would also allow reducing the importance of the support payments.

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