Evaluation of the Influence of the Export in Agricultural Products on the Baltic States Economic Growth

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ABSTRACT

The benefits of agricultural exports' impact to developing economies have been confirmed by most of researchers. When analyzing the Baltic States, attention should be paid firstly to the peculiarities of agriculture and to relatively low subsidies of the EU funds in comparison with the old EU countries. In addition, the support of agricultural sector creates a relatively unequal conditions of competition towards other economic activities. As a result, it is doubtful whether the export of agricultural products (which was extremely funded during the year of 2002-2013) contributes to the prosperity of Baltic states' economies. In order to meet set goal - to research the links between the export in agricultural products and economic growth of the Baltic States – correlation and regression analysis was used, covering the year of 2000-2016. Empirical calculations have shown that the export of agricultural products (by separate sections) contributes very little to the GDP growth of the Baltic economies; however, it negatively affects labor market indicators (self-employment, employment in land sector, the level of labor market). The reasons lie in rising prices of agricultural products (assessing the price index change), price indices (export growth is linked to higher agricultural prices), technological breakthrough in agriculture, which reduced the need for human capital and greater export opportunities for large farms, while mainly small size farms dominate in the Baltic States.

INTRODUCTION

One of the main purposes of economics is to efficiently *"allocate resources in order to ensure social welfare, including full employment and high living standards"* (Latruffe, 2010, p. 5). As general economics comprises a variety of sectors, each of them can contribute to national and/or regional economic growth.

In the era of industrialization (i.e. from 1800s till the 1950s (Enemark, 2001)), the role of the agricultural sector in national and/or regional economic growth was overshadowed by the development of industry and manufacture (Hydayatie, 2014). But the findings of recent studies (Henneberry, Curry, 2010; Verter, 2015; Verter and Becvarova, 2016, etc.) show that the contribution of agriculture cannot be underestimated.

Not only the development of the agricultural sector itself, but also a significant increase in the volumes of the international trade in agricultural products (in particular, agricultural export) is becoming an important catalyst of national and/or regional economic growth (Verter and Becvarova, 2014). Despite the fact that historically agricultural trade was concentrated on gaining the benefits from comparative advantage, currently it is driven by the modern theories of trade (Verter, 2015).

The World Trade Organisation is making a huge effort to promote international trade through reduction of trade barriers (quotas, subsidies, direct payments, import tariffs, duties, etc.) (Verter and Osakwe, 2015). The positive effects of this effort are transmitted to all types of international trade, including the trade in agricultural products. The positive links between the international trade in agricultural products and national and/or regional economic growth were identified by numerous scientific studies (Henneberry and Curry, 2010; Sanjuan-Lopez and Dawson, 2010; Erokhin et al., 2014; Hidayatie, 2014; Verter and Becvarova, 2014; Kang, 2015; Verter and Becvarova, 2016, etc.). Nevertheless, the largest part of studies confirm the positive effects of the international trade in agricultural products transmitted to developing economies (Wen et al., 2013; Hydayatie, 2014; etc.), while advanced countries are found to gain more benefits from economies of scale and self-efficiency (Verter, 2015; Lescheva et al., 2018).

Fast developing, but possessing the post-soviet economic heritage, three Baltic States (Lithuania, Latvia, Estonia) can be attributed neither to the category of emerging nor advanced economies. They are showing the trends of international trade openness (especially after accession to the EU economic community), but still maintain comparatively large shares of export to Russia, which makes the general characteristics of the changes in their economic competitiveness hard to define. Having the historical traditions of agriculture and following the European Common Agricultural Policy, Baltic States can expect their economies to be driven by the international trade in agricultural products. Therefore, the authors of this article find it purposeful to research the links between the export in agricultural products and the economic growth of the Baltic States.

The main purpose of this article is to research the links between the export in agricultural products and economic growth of the Baltic States (Lithuania, Latvia, Estonia). The main purpose was detailed into the following ***objectives:*** a) to review the findings of the scientific literature on the impact of the export in agricultural products on economic growth; b) to select and substantiate the methodology of the research; c) to introduce the results of the empirical research on whether the export in agricultural products promotes the growth of three Baltic States – Lithuania, Latvia and Estonia. ***The methods*** of the research include systematic and comparative literature analysis, correlation and regression analysis.

1. LITERATURE REVIEW

As it was noted by Verter (2015), the landscape of the international trade in agricultural products is changing, which determines growing scientific interest in this area. Some researchers provide the arguments supporting this type of trade as it is considered to ensure varieties of food, increase the food choice for population (Verter, 2015), keep a high level of commodity concentration (Karasova, 2016), maintain the stability of food demand and supply (Erokhin and Ivolga, 2013), and prompt foreign earnings and national income (Sanjuan-Lopez and Dawson, 2010; Verter and Becvarova, 2014; Verter, Bečvarova, 2016, etc.), while others criticize it for protectionism (Laborde and Martin, 2012; Markovic and Markovič, 2014, etc.), distortion of the conditions of free market competition (Josling et al., 2010; Franic and Mikus, 2013, etc.), closiness (Wen et al., 2013; Cai, Song, 2016; Viju et al., 2017, etc.), high-cost production (Wen et al., 2013; Cai, Song, 2016, etc.), inconsistence of long-term prices (Josling et al., 2010; Tothova, 2011; Roux, 2013, etc.) and incomplete international price transmission (Yang et al., 2017).

The analysis of the scientific literature has allowed to review the scientific findings on the impact of the international trade in agricultural products on economic growth (see Table 1).

Table 1. Review of the scientific findings on the impact of the international trade in agricultural products on economic growth

Author(s), year	Research methods	Country/Region/ Economy	Findings
Verter, Becvarova, 2016	OLS regression, Granger causality, impulse response function, variance decomposition	Nigeria	Agricultural exports lead to economic growth, but the relationship between the agricultural degree of openness and economic performance is inverse
Verter, 2015	Descriptive analysis of annual statistical data	Sub-Saharan African countries, advanced economies	International trade in agriculture is an important driver of the economic growth in developing countries where agriculture is the major product exporter; advanced countries gain benefits from economies of scale and self-efficiency
Erokhin et al., 2014	EPACIS – the model of partial equilibrium	Developed and developing economies	Agricultural trade maintains stable demand and supply that, in turn, leads to efficient exchanges and stimulates economic growth and development
Yang et al., 2017	Global trade analysis project with incorporation of incomplete price transmission	China	Incomplete price transmission mitigates the domestic price increases as responses to high international agricultural prices, which, in turn, leads to an increase in China's trade deficit and prohibits net food sellers from receiving high prices
Hydayatie, 2014	Endogenous gravity, autoregressive distributed lags, volume chain-link	Indonesia	The potential for agricultural exports, in particular the one which is facilitated through free trade agreements, contributes to Indonesian growth
Cai, Song, 2016	Statistical physics, graph theory, research paradigm of a complex network, improved bootstrap percolation	Different countries worldwide	Countries' rankings, provided with the aid of network's node centralities, present the global agricultural commodity trade as a closed, imbalanced, diversified and multi-polar development hardly promoting economic growth
Wen et al., 2013	Novy model	China	There is an obvious corresponding relationship between the trade potential and costs of agricultural products, which means that high costs lead to inadequate trade

Severini et al., 2017	Balanced farm-level panel data, non-linear robust regression	Italy	Direct payments for agriculture have mixed effects on the variability of farm income, while a negative significant relationship was found on the national sample; direct payments for agriculture are not effective in terms of income stabilization
Lescheva et al., 2018	Statistical analysis of state regulation of agriculture parameters (Producer Support Estimate, General Services Support Estimate, Consumer Support Estimate)	Emerging countries in comparison to selected OECD countries	Economic growth is ensured only on condition economic potential of agriculture as of a sector is exploited; growth rates of state support for agriculture are synchronised with the growth rates of the gross product in the agricultural sector
Laborde, Martin, 2012	Survey	Developed and developing countries	Agricultural exports can accelerate a balanced growth in all countries if only issues (trade restrictions and distortions) related to the world trade in primary agricultural trade are addressed or drastically reduced
Sanjuan-Lopez, Dawson, 2010	Panel cointegration	42 countries	Agricultural exports Grangercause economic growth
Henneberry, Curry, 2010	Causal relationship analysis	Pakistan	The relationship between agricultural exports and economic growth is positive
Kang, 2015	Econometric approaches	Rice exporting countries – Pakistan, Vietnam, Thailand	The relationship between agricultural exports and economic growth is positive
Yifru, 2015	Co-integration model, error correction model, Granger causality model	Ethiopia	The export of particular agricultural products (coffee and oilseeds) has a significant positive impact on national economic growth, while the export of some kinds of agricultural products (pulses) has a negative insignificant and a positive insignificant (in short and long runs respectively) impact on national economic growth

Source: compiled by the authors.

As it can be seen from Table 1, the scientific findings indicate that the impact of the international trade in agricultural products on economic growth is bidirectional. On one hand, agricultural exports are often found to lead to national economic growth (Sanjuan-Lopez and Dawson, 2010; Erokhin et al., 2014, etc.), especially in developing countries where this type of export makes the major share of the total country's export (Henneberry and Curry, 2010; Kang, 2015; Verter, 2015, etc.) and where it is facilitated through free trade agreements (Hydayatie, 2014). On the other hand, incomplete price transmission, observed in the international trade in agricultural products, mitigates a domestic price increase, which, in turn, may lead to a growth in a country's trade deficit (Yang et al., 2017), protectionism and high-cost production typical of this type of trade makes it a closed, imbalanced, diversified and multi-polar development (Wen et al., 2013; Cai and Song, 2016), and direct payments for farmers are ineffective in terms of national income stabilisation (Severini et al., 2017). All of these factors cause the negative impact of the international trade in agricultural products on economic growth. What is more, there is little scientific evidence on the economic growth promoted by the international trade in agricultural products in developed countries (in the area under research, the latter are found to earn more gains from economies of scale and self-efficiency (Verter, 2015)). This further confirms a bidirectional causality running from the international trade in agricultural products towards national economic growth.

Summarising, previous findings of the scientific research in whether the international trade in agricultural products promotes economic growth are contradictory as they indicate bidirectional causality between the international trade in agricultural products and economic growth. The most general findings show that the international trade in agricultural products may ensure economic growth only on condition that the agricultural export accounts for the major share of the total national export (the trend mainly observed in developing economies), the full economic potential of the agricultural sector is exploited, and agricultural export is accelerated by reduction of trade restrictions and distortions. As the situation in the Baltic States, which can be considered transition economies (transferring from a command to free market economic system), thus far has been hardly investigated, the authors of this article find it purposeful to research whether the international trade in agricultural products promotes economic growth of these states.

2. METHODOLOGICAL APPROACH

In scientific literature, classical assessment of the links between the phenomena under research is carried out by employing correlation analysis. In order to assess whether the Baltic countries export in agricultural products with different countries worldwide affects its economic growth, we employ the combination of Pearson correlation and multiple regression methods.

Pearson correlation coefficient evaluates the strength of the linear relationship. It can be used when X and Y values of the random sizes under observation are measurable by an interval or on a relationship scale, and their two-dimensional distribution is normal.

The point estimate of the population Pearson correlation coefficient (sample's Pearson correlation coefficient) is estimated by the formula (Janilionis, 2015):

$$\hat{\rho} = r = \frac{\overline{xy} - \overline{x} \cdot \overline{y}}{\sqrt{\overline{x^2} - (\overline{x})^2}\sqrt{\overline{y^2} - (\overline{y})^2}}.$$

(1)

The multiple regression model refers to generalisation of a single variable linear regression model with more than one independent interval variable:

$$Y = \hat{a}_0 + \hat{a}_1 x_1 + \hat{a}_2 x_2 + ... + \hat{a}_k x_k + \hat{e}. \quad (2)$$

Prognostication of the values of a dependent variable is one of regression purposes. Let us presume that the data comprises n observations in a variable set: $(y_1, x_{11}, x_{21}, ... x_{k1})$, $(y_2, x_{12}, x_{22}, ... x_{k2})$, . . . , $(y_n, x_{1n}, x_{2n}, ... x_{kn})$. The aim is to find the values $a_0, a_1, a_2,...,a_k$ for parameters $\hat{a}_0, \hat{a}_1, \hat{a}_2,..., \hat{a}_k$ so that the function's $\hat{y}(\vec{x}) = \hat{y}(x_1, x_2,...,x_k) = a_0 + a_1 x_1 + a_2 x_2 + ... + a_k x_k$ estimates at the points $(x_{1i}, x_{2i}, ... x_{ki})$ would as little as possible vary from y_i, i=1, 2,..., n. The above-mentioned values are selected by applying the least squares method, i.e. they are selected so that residual errors $\hat{e}_i = y_i -$ $\hat{y}(\vec{x}_i) = y_i - (a_0 + a_1 x_{1i} + a_2 x_{2i} + ... + a_k x_{ki})$, would show the lowest square sum SSE = $\sum_{i=1}^{n} \hat{e}_i^2$. This way, function $\hat{y}(\vec{x})$, called *a regression function,* is developed. Prognosticated value Y is obtained by filling function $\hat{y}(\vec{x})$ with values $x_1, x_2, ...,x_k$, which fall into the data coverage area, i.e. $x_i \in (\min_j \chi_{ij}, \max_j \chi_{ij})$.

For implementation of the research purpose, time period 2000-2016 and 12 y values describing economic growth were selected (see Table 2):

Table 2: Description of dependent variables

No.	Dependent variable (y)	Description
1.	Gross domestic product at market prices, million euro	GDP (gross domestic product) is an indicator for a nation´s economic situation. It reflects the total value of all goods and services produced less the value of goods and services used for intermediate consumption in their production (Source: Eurostat).
2.	Unemployment, thousands persons	Unemployed persons are all persons 15 to 74 years of age (16 to 74 years) who were not employed during the reference week, had actively sought work during the past four weeks and were ready to begin working immediately or within two weeks (Source: Eurostat).
3.	Self-employed, total (% of total employment)	Self-employed workers are those workers who, working on their own account or with one or a few partners or in cooperative, hold the type of jobs defined as a "self-employment jobs." i.e. jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced. Self-employed workers include four sub-categories of employers, own-account workers, members of producers' cooperatives, and contributing family workers (Source: World Bank).
4.	Employment in agriculture (% of total employment)	Employment is defined as persons of working age who were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period or not at work due to temporary absence from a job, or to working-time arrangement (Source: World Bank).
5.	Goods and services expense (% of expense)	Goods and services include all government payments in exchange for goods and services used for the production of market and nonmarket goods and services. Own-account capital formation is excluded (Source: World Bank).
6.	Compensation of employees (% of expense)	Compensation of employees consists of all payments in cash, as well as in kind (such as food and housing), to employees in return for services rendered, and government contributions to social insurance schemes such as social security and pensions that provide benefits to employees (Source: World Bank).
7.	Subsidies and other transfers (% of expense)	Subsidies, grants, and other social benefits include all unrequited, non-repayable transfers on current account to private and public enterprises; grants to foreign governments, international organizations, and other government units; and social security, social assistance benefits, and employer social benefits in cash and in kind (Source: World Bank).
8.	Labour force	Labour force comprises people ages 15 and older who supply labour for the production of goods and services during a specified period. It includes people who are currently employed and people who are unemployed but seeking work as well as first-time job-seekers. Labour force size tends to vary during the year as seasonal workers enter and leave (Source: World Bank).
9.	Tax revenue (% of GDP)	Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue (Source: World Bank).
10.	Inflation, consumer prices (annual %)	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used (Source: World Bank).
11.	Foreign direct investment, net inflows (BoP, current US$)	Foreign direct investment refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy (Source: World Bank).
12.	Total governmental final consumption expenditure (annual % growth)	Annual percentage growth of the total governmental final consumption expenditure based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. Total governmental final consumption expenditure (total governmental consumption) includes all current governmental expenditure for purchases of goods and services (including compensation of employees). It also includes expenditure on national defence and security, but excludes governmental military expenditure that is part of government capital formation (Source: World Bank).

Source: prepared by the authors

In this study, the independent variables (x) are Lithuanian, Latvian, and Estonian exports according to sections.

Complex multi-regression calculations were performed by employing modern computer software: specialised packages for statistical data analysis (SPSS, EPIINFO, SAS, MINITAB, etc.) and Ms Excel's specialized sub-system *Data Analysis* (*Regression* module).

3. CONDUCTING RESEARCH AND RESULTS

After having performed Pearson correlation calculations between exports of agricultural products from / to the rest of the world to the Baltic States and 12 indicators characterizing economic growth, statistically significant, moderate and strong correlations between the export of agricultural products from the Baltic States and these variables were received (see Table 3):

Table 3. Significant statistical relations between exports in terms of sections and economic indicators in the Baltic States

Y	Lithuania		Latvia		Estonia	
Gross domestic product at market prices, million euro	I section 1,752	r_{total} (0.940) 0,000	I section 2,114	r_{total} (0.855) 0,000	IV section 1,06	r_{total} (0.940) 0,000
Self-employed, total (% of total employment)	I section -2,792	r_{total} (-0.828) 0,000	-	r_{total} (-0.539) 0,000	IV section 0,910	r_{total} (0.575) 0,000
Employment in agriculture, % of total employment	I section 3,190	r_{total} (-0.853) 0,000	IV section 4,341	r_{total} (-0.875) 0,000	III section 0,910	r_{total} (-0.746) 0,000
Goods and services expense, % of expense	I section 0,863	r_{total} (-0.805) 0,000	I section 3,263	r_{total} (-0.662) 0,000	IV section 2,079	r_{total} (-0.755) 0,000
Subsidies and other transfers, % of expense*	-	$r_{2002-2013}$ (0.865) 0,000		$r_{2002-2013}$ (0.721) 0,000	-	-
Labour force, people	I section -0.901	r_{total} (-0.843) 0,000		r_{total} (-0.762) 0,000	-	-

* Subsidies for export of agricultural products were launched for the period 2002-2013. Therefore, correlation and regression are applied for two periods, i.e. 2002-2013 and 2014-2016

Source: own calculations

Pearson correlation coefficient values and obtained multiple regression equations allow us to formulate the following conclusions:

– Statistically significant positive and very strong correlation between the total exports of agricultural products and GDP suggests that *export in Baltic States contributes to the growth of GDP, but only for a small part of it* (see annexes, multiple regression equation for the GDP indicator). Export of agricultural products contributes, although to a very small extent, to the GDP growth of the Baltic States, however, the influence on the weight of sections of agricultural products on GDP in individual countries has been different. For example, the export of section IV to the world (prepared foodstuffs; beverages spirits and vinegar; tobacco and manufactured tobacco substitutes) had the biggest positive influence in Estonia during the period of 2000-2016.

Whereas in Lithuania and Latvia section I (live animal and animal products) the weight of export was the biggest in comparison to the export of section III in both countries (Beta Coefficient 1.752 in Lithuania and Beta coefficient 2.114 in Latvia) and export of section IV production exclusively in Lithuania.

– Strong negative correlation between **self-employment** in Lithuania and the **total export of agricultural products** has shown that the growth of export volumes to the world's countries has had an opposite effect on self-employment, i.e. increasing volumes of exports did not contribute to the increase level of self-employment. From 2000 until 2016, the volumes of export have increased 10 times (in eur), while the level of self-employment (% of total employment) decreased by 7.1% during the period in consideration. In Latvia, statistically weaker negative correlation was established, however, further calculations of multiple regression showed that general exports did not have statistically significant relationships with the level of self-employment in Latvia. The average, but positive relation obtained in Estonia suggests that, as export volumes grew, self-employment tended to grow (during the period of 2000 – 2016 self-employment in Estonia grew up to 1,4 percent, volume of export grew up to 5 times (in eur)). Export of section I and IV contributes not significantly to the dynamics of self-employment in Lithuania and Estonia. In Lithuania, as in the case of GDP, export volume of section I (Beta coefficient -2,792) more affected self-employed people, while in Estonia, export volume of section IV (Beta coefficient 0,910) has contributed to the growth of self-employment.

– Similar conclusions can be stated on the strong statistically significant negative relationships in all Baltic States between exports and employment in agriculture, which suggest that the growth of exports has led to a decrease in employment in this sector. When assessing the impact of exporting agricultural products on **employment in the agricultural sector,** it can be stated, that not significant impact in Baltic States gives different effects: export of section III in Estonia (animal or vegetable fats and oils and their cleavage products; prepared and edible fats; animals or vegetable waxes) had the biggest impact on employment in agriculture (Beta coefficient 0,910), export section I in Lithuania (Beta coefficient 3,190), export section IV in Latvia (Beta coefficient 4,341). In the Baltic States there are mainly small farms that supply their products to domestic markets. Since 2004, when the Baltic States entered the EU, investment programs for agricultural development were launched for the Baltic States. The development has enabled to acquire many new and innovative techniques to meet the demand for lower human capital; the structure of capital has changed. A large number of farms have switched to plant production, so employment in the land sector has dropped dramatically as the need for human resources has decreased. Other reason of inverse connection was fixed increase in the price of agricultural products during the period considered. An analogous justification would apply to **labor force**, although statistically significant negative connection was obtained only in the cases of Lithuania and Latvia.

– Statistically significant negative medium-strong relationships in the cases of Latvia and Estonia, and strong relationships in the case of Lithuania between export of agricultural products and **goods and services costs** suggest that the prices of agricultural products affected the costs of goods and services, i.e. increased export volumes have reduced the costs to a small extent, however this tendency occurred due to rising prices of exported production in agricultural products.

– Strong relationships (the case of Lithuania) and medium-strong relationship (the case of Latvia) between subsidies and export during the period of 2002-2013 have revealed, that the export activity in subsidized agricultural products were closely interrelated, since exporters were paid export refunds. During the period of 2013-2016 the EU stopped subsidies for export, so there were no statistically significant relationships recorded during this period.

CONCLUSION

Researches at theoretical level undoubtedly justify the benefits of export to the economies of the countries, but exports of agricultural products due to their specificity and the peculiarities of subsidization lack of researches to prove these statements. The analysis of the problems in the Baltic countries of exporting agricultural products was chosen due to equal EU subsidy programs provided to these countries, similar climatic conditions, all these countries have entered the EU in 2004 and have applied general agricultural policy scheme in single payments for land.

The calculations showed that exports of agricultural products insignificantly, but still contributed to the GDP of the Baltic economies. Due to EU agricultural subsidy policies and support programs, other statistically significant relationships revealed the following regularities: exports of agricultural products have a negative statistically significant relationship with self-employment, and employment in the agricultural sector in the Baltic States and labor force level in the case of Lithuania. Based on the general principles of increasing export volumes, the level of employment, including self-employment and employment in the agricultural sector, should increase, however while analyzing the agricultural sector, these main causes of inverse relationships are pointed out:

- Price increase (assessing the change of price indices), when exports of agricultural products are expressed in monetary terms, contributing to the formation of inverse relationships;
- Launched programs since 2004, have contributed towards the introduction of technology and innovation in agriculture, which resulted in gradually moving towards lower human capital utilization;
- In the Baltic States, small farms that supply their products to the domestic market prevail, and therefore large dominant farms reveal the specificity of this phenomenon, when large farms mainly export to foreign markets;
- Agricultural sector is closely linked to the villages of the Baltic States, which have a population of about one third of total population, but aging population, international and internal emigration, and social exclusion are secondary factors that have shown a negative relationship between export agricultural products and labor market indicators.

Empirical calculations have shown that when analyzing agricultural products in international trade it is necessary to consider periods of financing by various means and factors, such as prices of agricultural products (price indices), restrictions on international trade in key export partners, European Commission state aid schemes.

REFERENCES

Cai, H.; Song, Y. (2016), "The state's position in international agricultural commodity trade: a complex network", *China Agricultural Economic Review*, Vol. 8, No. 3, pp. 430-442. doi: 10.1108/CAER-02-2016-0032

Enemark, S. (2001), "Land administration infrastructures for sustainable development", *Property Management*, Vol. 19, No. 5, pp. 366-383.

Erokhin, V., Ivolga, A. (2013), *Ensurance of sustainable rural development through liberalization of trade with agricultural commodities and CAP reforms*, Retrieved from: http://ageconsearch.umn.edu/record/163044/files/Chapter%20III%20-%20Erokhin%20V._%20Ivolga%20A..pdf

Erokhin, V., Ivolga, A., Heijman, W. (2014), "Trade liberalization and state support of agriculture: effects for developing countries", *Agricultural Economics – Czech*, Vol. 58, No. 11, pp. 354-366.

Franic, R., Mikus, O. (2013), "Transformations in Croatian Agriculture and Agricultural Policy: Challenges and Opportunities within the European Context", in Dionisio Ortiz-Miranda, Ana Moragues-Faus, Eladio Arnalte-Alegre (ed.) *Agriculture in Mediterranean Eu-*

rope: Between Old and New Paradigms (Research in Rural Sociology and Development, Vol. 19, Emerald Group Publishing Limited, pp. 233 – 261.

Henneberry, D. M., Curry, K. (2010), "Agricultural import demand in large markets: an aggregate analysis with high and low growth subgroups", Journal of Food Products Marketing, Vol. 2, No. 3, pp. 67-87.

Hidayatie, E. P. (2014), Agricultural trade, economic growth and free trade agreements: studies of the Indonesian case, Retrieved from: http://vuir.vu.edu.au/29991/1/Estty%20Purwadiani%20Hidayatie.pdf

Josling, T.; Anderson, K.; Schmitz, A.; Tangermann, S. (2010). Understanding international trade in agricultural products: one hundred years of contributions by agricultural economists. Retrieved from https://fsi.stanford.edu/sites/default/files/Understanding_International_Trade.pdf

Kang, H. (2015), "Agricultural exports and economic growth: empirical evidence from the major rice exporting countries", Agricultural Economics – Czech, Vol. 61, No. 2, pp. 81–87.

Karasova, N. (2016), "Comparative advantages in international trade of Ukrainian agriculture", Management Theory and Studies for Rural Business and Infrastructure Development Vol. 38, No. 2, pp. 230-239. doi: 10.15544/mts.2016.18 2016.

Laborde, D., Martin, W. (2012), "Agricultural trade: what matters in the Doha round?", Annual Review of Resource Economics, Vol. 4, pp. 265-283.

Latruffe, L. (2010), "Competitiveness, productivity and efficiency in the agricultural and agri-food sectors", OECD Food, Agriculture and Fisheries Papers, No. 30, OECD Publishing, Paris. Retrieved from: http://dx.doi.org/10.1787/5km91nkdt6d6-en

Lescheva, M., Ivolga, A., Labenko, O. (2018), "State support of agricultural production in emerging countries as a tool to ensure food security", In Establishing Food Security and Alternatives to International Trade in Emerging Economies, IGI Global, pp. 55-73.

Markovic, I.; Markovic, M. (2014), Agricultural protectionism of the European Union in the conditions of international trade liberalization, Retrieved from http://ageconsearch.umn.edu/bitstream/175292/2/11%20EP%202%202014-11.pdf

Roux, N. (2013), Volatility in global agricultural commodity markets and changes in consumer food prices in France, Retrieved from https://www.economie.gouv.fr/files/files/directions_services/dgccrf/documentation/dgccrf_eco/english/dgccrf_eco12_volatility__global_agricultural_markets.pdf

Sanjuan-Lopez, A. I., Dawson, P. J. (2010), "Agricultural exports and economic growth in developing countries: a panel cointegration approach", Journal of Agricultural Economics, Vol. 61, No. 3, pp. 565-583. doi: 10.1111/j.1477-9552.2010.00257.x

Severini, S., Tantari, A., Di Tommaso, G. (2017), "Effect of agricultural policy on income and revenue risks in Italian farms: implications for the use of risk management policies", Agricultural Finance Review, Vol. 77, No. 2, pp. 295-311.

Tothova, M. (2011), "Main Challenges of Price Volatility in Agricultural Commodity Markets", In I. Piot-Lepetit, R. M'Barek (eds.), Methods to Analyse Agricultural Commodity Price 13 Volatility, pp. 13-29. doi 10.1007/978-1-4419-7634-5_2.

Verter, N. (2015), "The application of international trade theories to agriculture", Mediterranean Journal of Social Sciences, Vol. 6, No. 6, pp. 209-219.

Verter, N., Becvarova, V. (2014), "Analysis of some drivers of cocoa export in Nigeria in the era of trade liberalization", Agris On-Line Papers in Economics and Informatics, Vol. 6, No. 4, pp. 208-218.

Verter, N., Becvarova, V. (2016), The impact of agricultural exports on economic growth in Nigeria, Retrieved from https://acta.mendelu.cz/media/pdf/actaun_2016064020691.pdf

Verter, N., Osakwe, N. C. (2015), "Economic globalization and economic performance dynamics: some new empirical evidence from Nigeria", Mediterranean Journal of Social Sciences, Vol. 6, No. 1, pp. 87–96.

Viju, C., Smyth, S. J., Kerr, W. A. (2017), "Agricultural Biotechnology and Food Security: Can CETA, TPP, and TTIP Become Venues to Facilitate Trade in GM Products?", in Andrew Schmitz , P. Lynn Kennedy , Troy G. Schmitz (ed.) World Agricultural Resources and Food

Security (Frontiers of Economics and Globalization, Vol. 17, Emerald Publishing Limited, pp. 191 – 206.

Wen, S., Zheng, J., Liu, X. (2013), "An analysis on China's agricultural bilateral trade costs? 1995-2007", *China Agricultural Economic Review*, Vol. 5, No. 3, pp. 360-372.

Yang, F., Urban, K., Brockmeier, M., Bekkers, E., Francois, J. (2017), "Impact of increasing agricultural domestic support on China's food prices considering incomplete international agricultural price transmission", *China Agricultural Economic Review*, Vol. 9, No. 4, pp. 535-557.

Yifru, T. (2015), *Impact of agricultural exports on economic growth in Ethiopia: the case of coffee, oilseed, and pulses*, Retrieved from: https://ageconsearch.umn.edu/bitstream/243473/2/ TIGIST%20YIFRU%20MSc%20THESIS.pdf

Annexes 1.

	Equation of Multiple Regression	Explanation
Y1	$GDP_{Estonia}$ = 8.070.173-2.88E-0.5*I section+3.57E-05*II section+3.09E-05*IV section $GDP_{Lithuania}$ = 9.578,769+4.15E-05*I section+1,35E-04*III section+1.93E-05*IV section GDP_{Latvia} = 9.069,836+7.55E-05*I section-0,001*III section	Reduced export volume by 1 unit of section I, $GDP_{Estonia}$ reduces by 2.88E-05 eur, when other conditions do not change. Increased export volume by 1 unit of section II, $GDP_{Estonia}$ increases by 3.57E-05 eur, when other conditions do not change. Increased export volume by 1 unit of section IV, $GDP_{Estonia}$ increases by 3.09E-05 eur, when other conditions do not change. Beta coefficients show that the biggest impact to $GDP_{Estonia}$ makes *export of section IV* (1.067). Increased export volume by 1 unit of section I, $GDP_{Lithuania}$ increases by 4.15E-05 eur, when other conditions do not change. Increased export volume by 1 unit of section III, $GDP_{Lithuania}$ increases by 1.35E-04 eur, when other conditions do not change. Increased export volume by 1 unit of section IV, $GDP_{Lithuania}$ increases by 1.93E-05eur, when other conditions do not change. Beta coefficients show that the biggest impact to $GDP_{Lithuania}$ makes *export of section I* (1.752). Increased export volume by 1 unit of section I, GDP_{Latvia} increases by 7.55E-05 eur, when other conditions do not change. Reduced export volume by 1 unit of section III, GDP_{Latvia} reduces by 0,001 show, that the biggest impact to GDP_{Latvia} *makes export of section I (2.114).*
Y3	$Self\text{-}employed_{Estonia}$ = 2.18E-08*IV section $Self\text{-}employed_{Lithuania}$ = 23.016-2.94E-08*I section+1.36E-08*IV section	Increased export volume by 1 unit of section I, $Self\text{-}employed_{Estonia}$ increases by 2.18E-08 percent from all employed, when other conditions do not change. Reduced export volume by 1 unit of section I, $Self\text{-}employed_{Lithuania}$ reduces by 2.94E-08 percent from all employed, when other conditions do not change. Increased export volume by 1 unit of section IV, $Self\text{-}employed_{Lithuania}$ increases by 1.36E-08 percent from all employed, when other conditions do not change. Beta coefficients show that the biggest impact to $Self\text{-}employed_{Lithuania}$ makes *export of section I* (-2,792) and $Self\text{-}employed_{Estonia}$ – makes *export of section IV (0,910).*
Y4	Employment in agriculture $_{Estonia}$ = 6,559-5.87E-08*III section Employment in agriculture $_{Lithuania}$ =5.35E-08*I section-3.11E-08*II section Employment in agriculture $_{Latvia}$ =-4.21E-08*II section-1.19E-06*IIIsection+7.26E-08*IV section	Reduced export volume by 1 unit of section III, Employment in $agriculture_{Estonia}$ reduces by 5.87E-08 percent from all employed, when other conditions do not change. Increased export volume by 1 unit of section I, Employment in $agriculture_{Lithuania}$ increases by 5.35E-08 percent from all employed, when other conditions do not change. Reduced export volume by 1 unit of section II, Employment in $agriculture_{Lithuania}$ reduces by 3.11E-08 percent from all employed, when other conditions do not change. Reduced export volume by 1 unit of section II, Employment in $agriculture_{Latvia}$ reduces by 4.21E-08 percent from all employed, when other conditions do not change.

		Reduced export volume by 1 unit of section III, Employment in agriculture$_{Latvia}$ reduces by 1.19E-06 percent from all employed, when other conditions do not change. Increased export volume by 1 unit of section IV, Employment in agriculture$_{Latvia}$ increases by 7.26E-08 percent from all employed, when other conditions do not change. Beta coefficients show that the biggest impact to Empolment in agriculture$_{Lithuania}$ makes *export of section I (3,190)*, Employed in agriculture$_{Estonia}$ – *export of section III (0,910)*, Employed in agriculture$_{Latvia}$ – *export of section IV (4,341)*.
Y5	Goods and services expense (% of expense) $_{Estonia}$ = 12,904+1.98E-08*I section-2.19E-08*IV section Goods and services expense (% of expense) $_{Lithuania}$ = 15,873-7.20E-09*I section Goods and services expense (% of expense) $_{Latvia}$ = 15,799+2.02E-08*IV section-5.73E-08*I section	Increased export volume by 1 unit of section I, Goods and services expense$_{Estonia}$ increases by 1.98E-08 percent of total expenses, when other conditions do not change. Reduced export volume by 1 unit of section IV, Goods and services expense$_{Estonia}$ reduces by 2.19E-08 percent of total expenses, when other conditions do not change. Reduced export volume by 1 unit of section I, Goods and services expense$_{Lithuania}$ reduces by 7.20E-09 percent of total expenses, when other conditions do not change. Increased export volume by 1 unit of section IV, Goods and services expense$_{Latvia}$ increases by 2.02E-08 percent of total expenses, when other conditions do not change. Reduced export volume by 1 unit of section I, Goods and services expense$_{Latvia}$ reduces by 5.73E-08 percent of total expenses, when other conditions do not change. Beta coefficients show that the biggest impact to Goods and services expense$_{Lithuania}$ makes *export of section I (0,863)*, Goods and services expense$_{Estonia}$ – *export of section IV (2,079)*, Goods and services expense$_{Latvia}$ – *export of section I (3,263)*.
Y8	Labour force$_{Lithuania}$ = 1.664.692,472-1.79E-04*I section Labour force$_{Latvia}$ = -0,019*I section+0,032*III section+0,006*IV section	Reduced export volume by 1 unit of section I, Labour force$_{Lithuania}$ reduces by 1.79E-04 units, when other conditions do not change. Reduced export volume by 1 unit of section I, Labour force$_{Latvia}$ reduces by 0,019 units, when other conditions do not change. Increased export volume by 1 unit of section III, Labour force$_{Latvia}$ increases by 0,032 units, when other conditions do not change. Increased export volume by 1 unit of section IV, Labour force$_{Latvia}$ increases by 0,006 units, when other conditions do not change. Beta coefficients show that the biggest impact to Labour force$_{Lithuania}$ makes *export of section I (0,901)*, Labour force$_{Latvia}$ – *export of section IV (4,114)*.