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# The foreign trade liberalization and export of agri-food products of Serbia

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**Abstract:** Liberalization of the market, as a consequence of the achieved trade agreements with the members of the European Union and the Central European Free Trade Association, had a significant effect on the foreign trade exchange of the Serbian agri-food products. In order to determine the liberalization effects on the export of agri-food products of Serbia, a gravity model of the export of these products is estimated using econometric methods for the panel data. In order to find the sections, as well as the advantageous parts of the international market, the comparative advantages of agri-food products in the particular groups of countries are dynamically analysed using the index of the revealed comparative advantages, whereas the level of specialization in the international trade exchange of these products is analysed using the index of the intra-industry trade. In relation to the main objective of the article, which was to identify the effects of the foreign trade liberalization on the performances of the foreign trade in agri-food products, it may be stated that liberalization had positive effects on the intensification of foreign trade with the analysed group of countries, as well as on the increase of the revealed comparative advantages of the agri-food sector in the world market.

**Keywords:** agriculture, export, competitiveness, comparative advantages, gravity model, Serbia, EU, CEFTA

The current moment in the foreign policy of Serbia, characterized by the integration with the international market, brings numerous changes in the agri-food sector. For a longer period of time, Serbia, as well as the other Western Balkan countries, is in the process of adaptation of its economic system to the regulations of the European Union (EU) and the World Trade Organization (WTO). Accordingly, it is necessary to accept the regulations and principles related to the international trade with agri-food products, which are governed by the WTO Agreement on Agriculture and which are also being significantly changed within the current Doha round negotiations.

Within the integration of Serbia in the EU, the process of liberalization has started through the Autonomous Trade Measures (ATM), which enable the duty-free export of Serbian agri-food products in the EU countries, except for beef, sugars, wine and trout. The Stabilization and Association Agreement (SAA) with the EU was signed in 2008, its usage started in 2010, and in the interim, until 2014, the free trade zone with the EU countries has been gradually estab-

lished. According to Chevassus-Lozza et al. (2008), in the case of the EU enlargement, the accession to the Single European Market is conditional upon the candidate countries 'acceptance of internal market obligations, and therefore making their national legislation compatible with the body of laws and regulations of the EU, the so-called *acquis communautaire*.

According to Mizik and Meyers (2013), the experience of other new EU member states from the Central and Eastern Europe shows that price, production and trade can significantly change after the accession as well as during the pre-accession period. The extent of this adjustment occurring before or after the accession depends on the pre-accession policy and market adjustments. Crucial tasks for these countries during the accession process are finding niche markets or being cost competitive. The Western Balkan countries, in order to more easily prepare for the membership in the EU and to enable the integration of the regional market, signed the Central European Free Trade Association Agreement (CEFTA) in 2006 which implies the integration, i.e. the creation of the

free trade zone between the countries of this region. Apart from Serbia, the CEFTA member states are Bosnia and Herzegovina, Montenegro, Macedonia, Albania, Moldavia, Kosovo (UNMIK on behalf of Kosovo), as well as Bulgaria, Romania, and Croatia until the EU accession.

In the context of the achieved liberalization of the market in the last decade, significant results were achieved in the foreign trade exchange of Serbian agri-food products, which is represented by the surplus that Serbia has been continually realizing since 2005. According to Stojanovic et al. (2013), as far as the agri-food products are concerned, Serbia's trade was constantly decreasing during the last decade of the 20th century. After a long governance of the agriculture trade deficit, a period of surplus started mainly due to the growing trade export volume with the EU countries.

Since the EU membership is the unquestioned political direction for Serbia, according to Zekic and Matkovski (2014) the complementary agricultural policy and the growth of agricultural competitiveness will be fundamental imperatives of the national policy in the field of agriculture. This, not a simple task, implies a large number of measures and coordinated activities, from the transfer of knowledge to changes in the structure of agricultural households, and its main aim is the advancement of agricultural production performances. It is necessary to have a strategic access to the further liberalization of the market, due to the fact that Serbia has to comply with the rules of international trade in accordance to the WTO. Because of that, according to Lovre (2013), in the future period the creators of the Serbian agricultural policy will have to create instruments which will simultaneously protect domestic production and exert influence on the increased competitiveness at the international market of agri-food products. Beside this, an organized access to products which possess comparative advantages will be an important condition for the achievement of the particular positions at the international market.

The effects of liberalization involve the effects of the achieved trade agreements with the EU and the CEFTA countries on the performances of the export of Serbian agri-food products, in terms of the change of intensity, trends and structure of the foreign trade exchange, as well as the change of comparative advantages and the level of specialization of agri-food export. A significant number of authors analysed the effects of the foreign trade liberalization which is the

result of the achieved foreign trade agreements. Using the estimation of gravity model in order to analyse changes in the foreign trade, Baier and Bergstrand (2007) concluded that the free trade agreements between particular countries have an effect on a significant increase of trade in the signatory countries. Also, according to Grant and Lambert (2008), the regional trade integrations have a significantly larger contribution to the increase of the exchange of agri-food products, than to the increase of other products exchanged among the member states.

In Serbia, as well as in the regional countries, there is a small number of researches related to the analysis of the effects of trade agreements, respectively related to the analysis of the effects of liberalization on the foreign trade exchange of agri-food products. In the paper Dragutinovic-Mitrovic and Popovic-Petrovic (2013), the analysis of the foreign trade liberalization and export of Serbian food is conducted by the estimation of the gravity model, and the empirical results show that the foreign trade liberalization, which is the result of the EU's approval of the ATM and the CEFTA Agreement, had significant positive effects on the export and bilateral food exchange of Serbia. In the research Stojanovic et al. (2013), the effects of the EU Preferential Trade Agreements and the CEFTA integration on Serbian food export, as well as the trade competitiveness of Serbian food trade related to its most important foreign markets are analysed, and the results of this research show the positive impact of these agreements reflected in the increase of the export of agri-food products.

The foreign trade liberalization results in changes in the level of comparative advantages and in the level of the intra-industry specialization. The authors Bozic and Nikolic (2013b) analyse the level of comparative advantages of Serbian agri-food sector on the global market and the major trading partners (the EU and the CEFTA member states), and the results show that the liberalization of the market led to certain changes in the comparative advantages of the agrarian sector. According to Ignjatijevic et al. (2014), who analysed the level of international competitiveness of the processed food sectors for the countries of the Danube region, in Serbia there is an increase of competitiveness of the processed food sector measured by the revealed comparative advantages. Birovljev et al. (2015) dynamically analysed the comparative advantages of the export of Serbian agri-food products in the regional countries, as well as the level of specialization in trade with these countries, and the

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results of their research showed that Serbia, although having the similar trade structure as the regional countries, owns comparative advantages in all regional countries, and as far as the level of specialization is concerned, in the most of the regional countries a high level of specialization is present.

Numerous researches showed a positive impact of the achieved agreements on the foreign trade exchange of agri-food products. However, the question is whether the exporting potentials of Serbian agri-food sector are sufficiently used, i.e. whether there are possibilities for an additional increase of export. The authors Gajic and Zekic (2013), analysing the relation between the value of the export of agri-food products and basic production resources – labour and land, concluded that Serbia does not achieve impressive results, even within the region, and the situation is even worse in comparison to the EU countries, which is the consequence of the extensiveness of Serbian agriculture concentrated on the crop production. Such production structure also causes the structure of the agri-food export of Serbia, in which the crop products of the lower processing phase are the dominant one, respectively the products with the low added value, while the share of livestock products, as well as the value of the final products, is extremely low. Analysing the level of the intra-industry trade specialization, the authors Bozic and Nikolic (2013a) point out the necessity of a further development of standards in terms of the development of quality, quantity and stability of the supply of agri-food export, especially in the case of products with a low level of competitiveness, such as meat and meat products, milk and milk products.

The achieved free trade agreements led to partial changes in the orientation of the export of agri-food products of Serbia, as well as to the intensification of the foreign trade with the EU and the CEFTA countries. The aim of this paper is the identification of the liberalization effects on the performance of the foreign trade with Serbian agri-food products. This paper provides an answer to the question of the contribution of the created free trade zone with the EU and the CEFTA countries to the export of agri-food products of Serbia. Apart from the mentioned researched questions, sections, divisions and commodity groups of agri-food products, which possess the comparative advantages on the markets of the analysed countries are considered, and on the basis of that, the level of the integration of Serbian agri-food products' market with the markets of these countries is determined.

## MATERIALS AND METHODS

For the necessary empirical basis of the research, a data basis of the Statistical Office of the Republic of Serbia (SORS) is used, specifically the data which are related to the foreign trade exchange of agri-food products in the period 2004–2013 (for Montenegro, the data from 2006 are used, from when it is an independent country). Data on the other countries' export are taken from the data basis of the U.N. Food and Agriculture Organization (FAOstat), and the data on the gross domestic product (GDP) per capita are taken from the data basis of the World Bank. According to the Standard International Trade Classification (SITC) – Revision 4, the concept of agri-food products covers the following divisions and commodity groups: 00 – Live animals; 01 – Meat and meat preparations; 02 – Dairy products and birds' eggs; 03 – Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof; 04 – Cereals and cereal preparations; 05 – Vegetables and fruit; 06 – Sugars, sugar preparations and honey; 07 – Coffee, tea, cocoa, spices and manufactures thereof; 08 – Feeding stuff for animals (not including unmilled cereals); 09 – Miscellaneous edible products and preparations; 11 – Beverages; 12 – Tobacco and tobacco manufactures; 21 – Hides, skins and fur skins, raw; 22 – Oil-seeds and oleaginous fruits; 261 – Silk; 263 – Cotton; 264 – Jute and other textile best fibres, news., raw or processed but not spun; tow and waste of these fibres (including yarn waste and garneted stock); 265 – Vegetable textile fibres (other than cotton and jute), raw or processed but not spun; waste of these fibres; 268 – Wool and other animal hair (including wool tops); 29 – Crude animal and vegetable materials, news; 41 – Animal oils and fats; 42 – Fixed vegetable fats and oils, crude, refined, or fractioned; 43 – Animal or vegetable fats and oils, processed.

Regarding the aim of considering the effects of the foreign trade liberalization of the market with the EU and the CEFTA countries in the export of agro-food products, a gravity model of panel is estimated. A gravity model of the foreign trade exchange between the countries has been used since the beginning of the second half of the twentieth century, and in the last years the model has been often used for the analysis of the effects of the preferential trade agreements. According to Bayer and Bertrand (2007), for over 40 years, the gravity equation has been a workhorse for the cross-country empirical analyses of the interna-

tional trade flows and – in particular – the effects of the free trade agreements on trade flows. The basis of the model is an assumption that the trade flow between the countries is directly proportional to the economic power of each country, and inversely proportional to the distance between their main economic centres. The basic form of the gravity model is (Timbergen 1962):

$$X_{ij} = \alpha Y_i^{\beta_1} L_i^{\beta_2} Y_j^{\beta_3} L_j^{\beta_4} D_{ij}^{\beta_5} e^{\delta V_{ij}} u_{ij}$$

where:  $X$  – a value of export;  $i$  – exporting country;  $j$  – importing country;  $Y$  – GDP;  $L$  – population;  $D$  – distance between the economic centres of  $i$  and  $j$  countries;  $V$  – a set of dummy variables which covers the effects of the mutual borders and preferential trade agreements;  $u$  – random error of the model

From the basic model, numerous specifications of the gravity model are derived (Bergstrand 1985; Grant and Lambert 2005; Dragutinovic-Mitrovic and Popovic-Petrovic 2013; Nastic 2013). This paper analyses a linear form of the model in which, instead of the variables  $Y_j$  and  $L_j$ , there figure the variable  $Y_j/L_j$  (GDP per capita of the importing country). The variables  $Y_j$  and  $L_j$  are omitted from the model since there is just one exporting country, so these variables vary only through time, not through dimension, which, in the presence of the temporal effects, causes a problem of multicollinearity. In order to analyse the effects of the foreign trade liberalization on the export of agri-food products of Serbia, the model is estimated on the basis of the panel data for the period 2004–2013:

$$\ln X_{ijt} = \ln \alpha + \beta_1 \ln(Y_{jt}/L_{jt}) + \beta_2 \ln D_{ij} + \beta_3 B_{ij} + \beta_4 CEFTA_{ijt} + \beta_5 SAA_{ijt} + u_{ijt}$$

where  $X_{ijt}$  – a dependent variable which represents the value of the export of agri-food products of Serbia (country  $i$ ) in the country  $j$  in period  $t$ ;  $Y_{jt}/L_{jt}$  – an independent variable which represents GDP per capita of the importing country  $j$  in period  $t$ ;  $D_{ij}$  – an independent variable which represents the distance between the countries  $i$  and  $j$ ;  $B_{ij}$  – a dummy variable which examines the effects of the mutual border on the export of agri-food products of Serbia. Since the mutual border, as a rule, implies a greater foreign trade exchange of the countries, the variable has the value 1 for the countries which have the mutual border with Serbia, and the value 0 for other countries;  $CEFTA_{ijt}$  – a dummy variable which covers effects of the CEFTA Agreement on the export of agri-food products of Serbia. The variable has the value 1 for

the member states during the implementation of the agreement, and the value 0 for other countries;  $SAA_{ijt}$  – a dummy variable which covers the effects of the SAA on the export of agri-food products of Serbia. The variable has the value 1 during the implementation of the agreement for the EU countries, and the value 0 for other countries;  $\mu_{ij}$  – individual effects in the panel model which cover the specificities of the bilateral export of Serbia to each regarded country;  $\lambda_t$  – temporal effects in the panel model, covering the impacts of the factors which vary through time, but not by pairs of countries;  $u_{ijt}$  – random error of the model.

Regarding the aim of analysing the positions of Serbian agri-food products on the global market, as well as on the markets of the EU and regional countries, indices of the relative trade balance, the comparative advantages, and of the level of specialization in the international exchange are used. The Relative Trade Balance (RTB) is calculated in the following way (Stojanovic et al. 2013; Bozic and Nikolic 2013b):

$$RTB_j = \frac{X_j - M_j}{X_j + M_j}$$

where:  $X$  – export;  $M$  – import;  $j$  – section, division, commodity group

The Index of Revealed Comparative Advantages (RCA) is calculated in the following way (Balassa 1965; Bielik et al. 2013; Ignjatijevic et al. 2014):

$$RCA_{ij} = \frac{\frac{X_{ij}}{X_{it}}}{\frac{X_{nj}}{X_{nt}}}$$

where:  $X$  – export;  $i$  – country;  $j$  – section, division, commodity group;  $t$  – total export;  $n$  – exporting country (group of countries)

The RCA index larger than 1 indicates the existence of comparative advantages. With the increase of the value of this index, the comparative advantages of that section, division or commodity group also increase. The sections, divisions and groups whose index of comparative advantages is larger than 3 have strong comparative advantages, whereas the value of the index of the revealed comparative advantages between 2 and 3 indicates significant comparative advantages. The value of this index which is between 1 and 2 indicates the satisfactory comparative advantages. A modified version of the index of comparative advantages for country ( $i$ ) and section, division, or commodity group ( $j$ ) is calculated in the following way (Nikolic et al. 2011; Bozic and Nikolic 2013b):

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$$RCA_{ij} = \frac{\frac{X_{ij}}{X_{it}}}{\frac{M_{ij}}{M_{it}}}$$

where:  $X$  – export;  $M$  – import,  $i$  – country;  $j$  – section, division, commodity group;  $t$  – total import/export

The RCA index is calculated both for the section of agri-food products on the international market, on the market of the EU and region, and for the sections, divisions and commodity groups of agri-food products individually. For the determination of the significance of intra-industry trade of the particular section, division or commodity group in the total trade ( $i$ ), between two countries (region), the Grubel-Lloyd index is used (Grubel and Lloyd 1975; Bojnec et al. 2005; Nikolic et al. 2011; Bozic and Nikolic 2013a):

$$GLIIT_j = \left[ 1 - \frac{\sum_j |X_{ij} - M_{ij}|}{\sum_j |X_{ij} + M_{ij}|} \right] \times 100$$

where:  $X$  – export;  $M$  – import,  $i$  – country;  $j$  – section, division, commodity group

The index of the intra-industry trade determines the level of integration of the particular section, division, or commodity group with the particular market, as well as the capability to compete. The value of this index close to 100% indicates the intra-industry trade which involves a higher level of the economic integration of the section, division or commodity group with the particular market, as well as an adaptation to the market conditions at lower costs. The index of the intra-industry trade is calculated for the foreign trade exchange of agri-food products (in total and by sections, divisions and particular commodity groups) with the main trade partners, as well as for the total foreign trade exchange. The values of this index larger than 15% indicates on the intra-industry trade, which implies that the section, division or commodity group is significantly integrated with the particular market, i.e. that there is an existence of a significant intra-industry trade within that section, division or commodity group (Bojnec et al. 2005; Bozic and Nikolic 2013a).

Specified methods have to show the total changes in the already defined performances of the export of agri-food products through: the determination of particular liberalization effects on changes in the total export (Gravity model), the analysis of RTB, the identification of comparative advantages of the particular sections, divisions or commodity groups of agri-food products (RCA), as well as the analysis

of the level of specialization in the international trade (GLIIT). Different aspects of the export performances are, to a large degree, covered by the defined methodology, thus enabling an integral inference on changes occurred due to the process of the foreign trade liberalization of Serbian agri-food products with the EU and the CEFTA. Namely, the changes of the performances of foreign trade include a wide spectrum of different elements, which are analysed by specified methods, and which together enable a comprehensive picture of the Serbian foreign trade position after signing trade agreements.

## RESULTS AND DISCUSSION

According to the FAO (2015), the participation of Serbia on the global market is only 0.10%, whereas on the EU market this share amounts 0.20%. Such a small participation of Serbia both on the global and on the EU market had a little effect on the trends and characteristics of the exchange, so the necessity of its adjustments to the terms of the international market appeared. However, as far as the export of Serbian agri-food products is concerned, significant results were achieved in the last decade, primarily because of the preferential status of products on the markets of the EU countries, the CEFTA countries, Russia, Belorussia, Turkey and the EFTA countries. The share of export of agri-food products in the total export, amounting 21.1%, represents a significant part of the total export of Serbia (Figure 1). From 2009, the value of the export of agri-food products

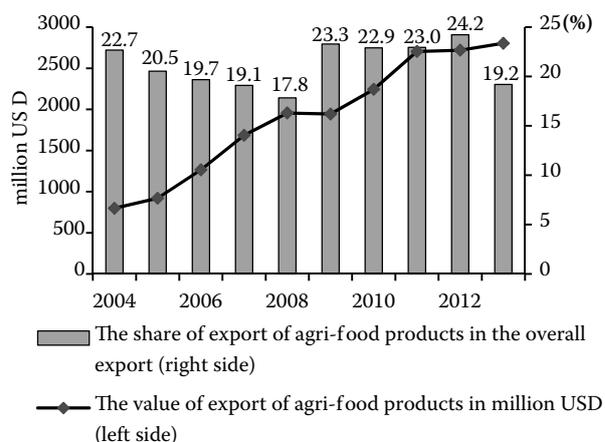


Figure 1. Trends in the export of agri-food products of Serbia

Source: The authors' calculations on the basis of the SORS (2015)

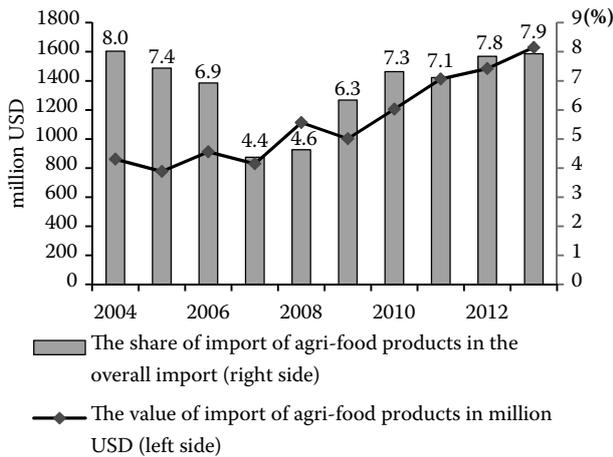


Figure 2. Trends in the import of agri-food products of Serbia

Source: The authors' calculations on the basis of the SORS (2015)

was on a constant increase. In 2013, in comparison to the value of export of agri-food products of 2004, this value has nominally more than tripled, so it can

be concluded that the global economic crisis did not have any side effects on the export of these products.

In the analysed period from 2004 to 2013, the share of the import of agri-food products in the total import amounted to about 8% of the total import of Serbia (Figure 2). As a result of the reduction of barriers on the borders, in accordance with the liberalization of the market, a range of imported products and a number of foreign competitors were expanded. From 2009, a permanent increase in the importing value of these products was present, and the value of import in 2013, in comparison to 2004, was nominally almost doubled.

Analysing the regional structure of the export of agri-food products (Figure 3a), it is noticed that the largest percentage of these products was placed on the EU market. In the analysed period, it amounted 48% of the total export of agri-food products. According to the SORS, in the initial years, the largest value of the export of agri-food products was realized within the old member states, and the assessments of new

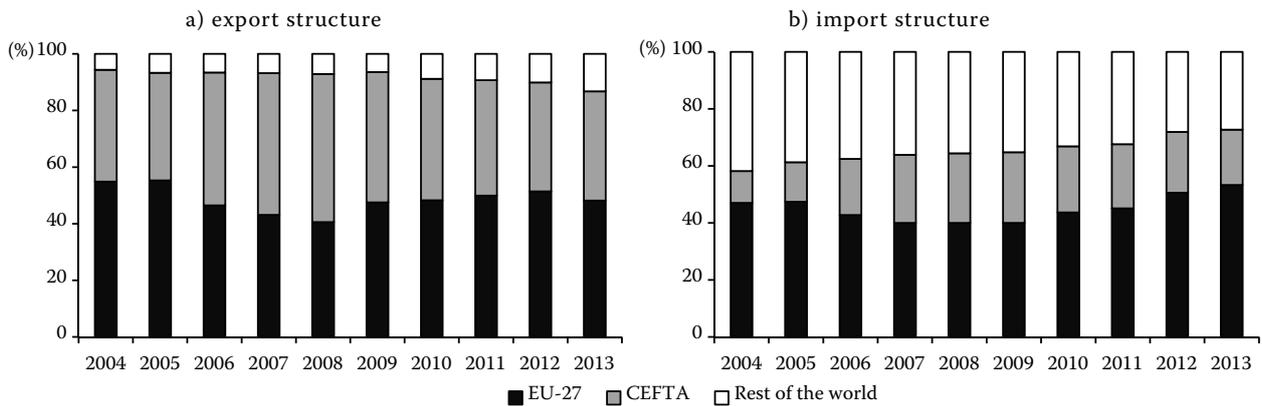


Figure 3. Regional trade structure of agri-food products of Serbia

Source: The authors' calculations on the basis of the SORS (2015)

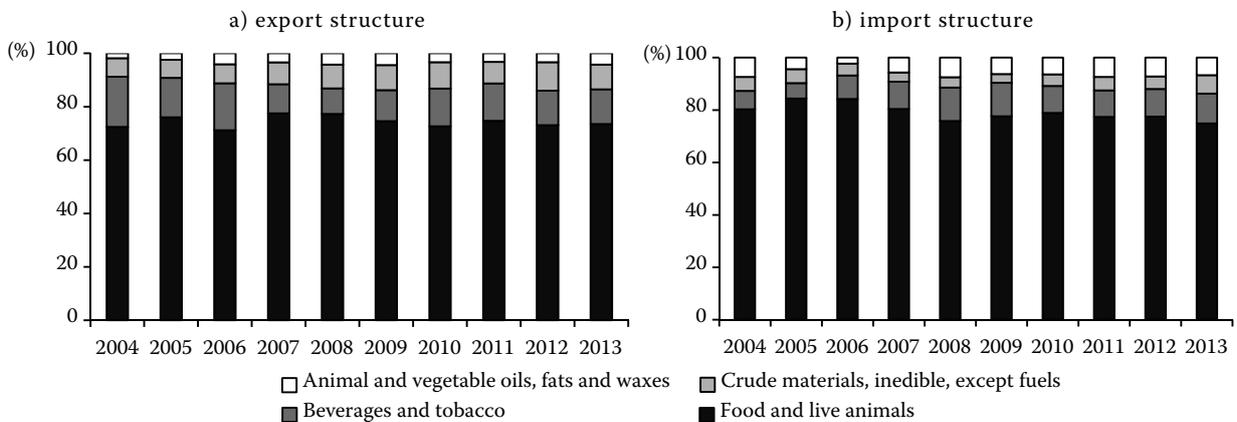


Figure 4. Commodity trade structure of agri-food products of Serbia

Source: The authors' calculations on the basis of the SORS (2015)

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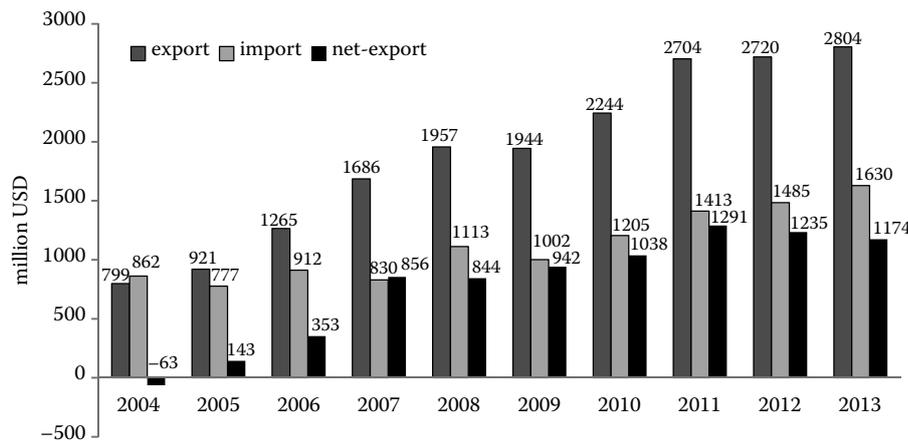


Figure 5. Trends of the net-export of agri-food products of Serbia

Source: The authors' calculations on the basis of the SORS (2015)

countries in the EU and achievement of the CEFTA Agreement led to the redirection of the export in these countries. In the analysed period, the export to the CEFTA countries amounted to about 43% of the total export of these products. As far as the import is concerned (Figure 3b), the largest percentage of agri-food products in the analysed period, about 46%, came from the EU countries. From 2003 to 2014, the import from the CEFTA countries significantly increased and its share in the total import of agri-food products was about 21%.

In the commodity structure of the export of agri-food products (Figure 4a), the section of food and live animals, with the share of the 78% in the total export, was the dominant one. Within this section, the divisions of vegetables and fruit, cereals and cereal preparations, as well as sugars and sugar preparations were the most significant. In the structure of the import of agri-food products (Figure 4b), the section of food and live animals, with the share of 78% in the total import, was the dominant one, too. Within this section, the divisions: vegetables and fruit, and coffee,

tea, cocoa, spices and manufactures thereof had the largest share in the total import, which amounted to about 14% of the total import of these products.

A positive foreign trade exchange balance of the agri-food products of Serbia has been realized since 2005 (Figure 5), as a consequence of the advancement of Serbian trade position through the bilateral negotiations with the regional countries, the achievement of the foreign trade liberalization with the EU countries and a significant increase of the export to the Russian market. In the recent years, the net export of agri-food products was larger than 1.1 billion USD.

During the analysed period 2004–2013, the relative trade balance of the entire foreign trade exchange of Serbia was negative, with the tendency of reduction, while the relative trade balance of agri-food products was negative only in 2004. From 2005, the relative trade balance of agri-food products of Serbia was positive. It significantly increased in 2007 and since then, it was on the level of 26–34% (Figure 6).

During the analysed period, the relative trade balance of agri-food products with the EU countries was

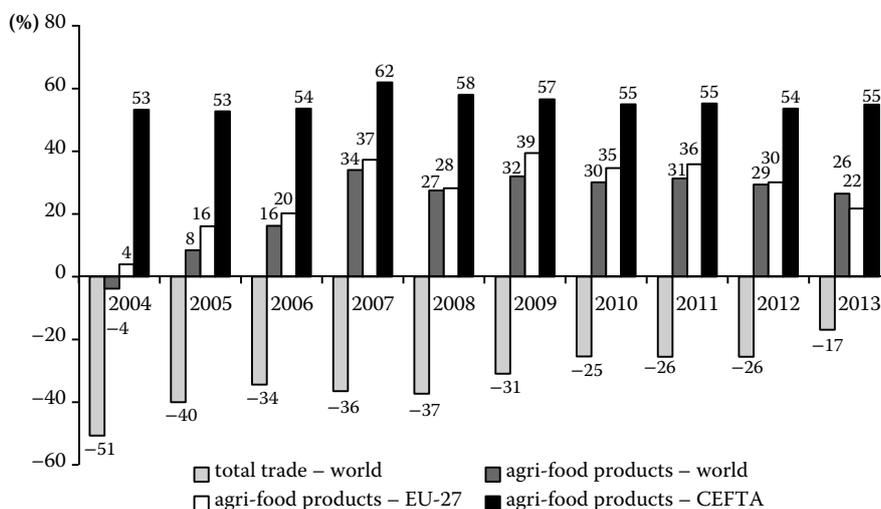


Figure 6. The relative trade balance of Serbia

Source: The authors' calculations on the basis of the SORS (2015)

positive, with a similar tendency as for all countries (2007–2013 between 22 and 39%), whereas the relative trade balance of the foreign trade exchange with the CEFTA countries was the highest and it amounted between 53 and 62%.

### Estimation of gravity model of the export of agri-food products

The gravity model of panel covers 97.3% of the total export of agri-food products in the period 2004–2013. The model covers 380 observations of the panel, i.e. it covers the export of Serbian agri-food products to 38 countries in the period 2004–2013. The EU member states, the member states of the CEFTA Agreement, as well as Russia, Belorussia, Kazakhstan, Switzerland and Turkey are included in the model as samples for the estimation. The procedure of the estimation and testing is conducted in the Gretl 1.10.0 software.

In order to decide between the fixed-effects (FE) and random-effects (RE) in the gravity model, the first step is the estimation of the model of random-effects. In the model of random-effects, the bilateral (individual) effects have a stochastic character, and because of that they represent a component of the random error, whereas in the model of the fixed-effects, these bilateral (individual) effects are comprehended as fixed parameters. In the literature, the estimation of the gravity model has been often suggested for the analysis of the bilateral trade, in order to avoid partiality of the estimation in the presence of correlation and bilateral effects. However, using a covariance method on the gravity model of

fixed-effects, it is not possible to estimate the effects of distance and mutual borders.

The choice between the fixed and random specification of the model (Table 1) is made by testing the existence of correlation between regressor and bilateral effects in the model of the random effects, using the Hausman test (Mudlak's criterion). The results of the Hausman test show the presence of correlation between certain regressors and bilateral effects in the model of random effects, i.e. the problem of single endogenous regressors can be noticed in the gravity model of the export of agri-food products. This problem causes the partiality in the estimation of the regressors' parameters in the model of the random-effects, which gives the advantage to the model of fixed-effects. In the gravity model of the export of agri-food products in the model of fixed-effects, using the Durbin-Watson (DW) test, the autocorrelation of the first order is noticed, because the value of the DW test (1.254115) is less than the lower critical value (1.81518), on the level of significance of 5%.

In order to remove the problem of the inefficient estimation of regressive parameters in the presence of autocorrelation in the model of fixed-effects, the gravity model of the export of agri-food products is estimated by the weighted least squared method (WLS), and the results are shown in the Table 2. Using this method in the process of the minimization of the sum of the square residuals, the residuals which have the higher absolute value get less weight and vice versa.

In the gravity model of the export of agri-food products, demand has a positive influence on the bilateral export, which is shown by the coefficient of

Table 1. Gravity model of the export of agri-food products in the model of random-effects and fixed-effects

Regressor	Random-effects (RE)		Fixed-effects (FE)	
	coefficient	<i>p</i> -value	coefficient	<i>p</i> -value
Const	7.59640	0.2082	-44.5343	< 0.0001***
$Y_{jt}/L_{jt}$	1.54192	0.0000***	5.55943	< 0.0001***
$D_{ij}$	-1.98018	0.0039***	–	–
$B_{ij}$	1.68876	0.1980	–	–
CEFTA <sub>ijt</sub>	1.21787	0.0000***	0.556196	0.0802*
SAA <sub>ijt</sub>	0.621467	0.0000***	0.548944	< 0.0001***
Hausman test	35.6568 (0,0000)		<i>R</i> -squared	0.851417
Breusch-Pagan test	874.729 (0,0000)		Adjusted <i>R</i> -squared	0.833885
DW test	–		1.254115	
Observations	380		380	

\*, \*\* and \*\*\* level of significance 10%, 5% and 1%, respectively

Source: The authors' calculations

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Table 2. Gravity model of the export of agri-food products in the model of weighted least squares

Regressor	Weighted least squares (WLS)			
	coefficient	std. error	<i>t</i> -ratio	<i>p</i> -value
Const	14.6983	0.805119	18.26	< 0.0001***
$Y_{jt}/L_{jt}$	0.700289	0.0581337	12.05	< 0.0001***
$D_{it}$	-1.78173	0.0842571	-21.15	< 0.0001***
$B_{ij}$	0.761712	0.169915	4.483	< 0.0001***
CEFTA <sub>ijt</sub>	0.644348	0.199499	3.230	0.0013***
SAA <sub>ijt</sub>	0.404204	0.0927938	4.356	0.0001***
<i>R</i> -squared	0.655527			
Adjusted <i>R</i> -squared	0.650922			
<i>F</i> -test (5, 374)	142.3434			
<i>P</i> -value (F)	< 0.0001***			
Observations	380			

\*\*\*level of significance 1%

Source: The authors' calculations

elasticity and GDP per capita of the importer, as the approximation of demand. A distance between the main economic centres has a significant and negative impact on the export of agri-food products of Serbia, while the mutual border with Serbia has a significant and positive impact on the export of agri-food products of Serbia. The CEFTA Agreement has a positive influence on the export of agri-food products from Serbia. The results of the gravity model estimation of the export of agri-food products to these countries show that the agreement contributed to the increase of the export of agri-food products in average 90.47%

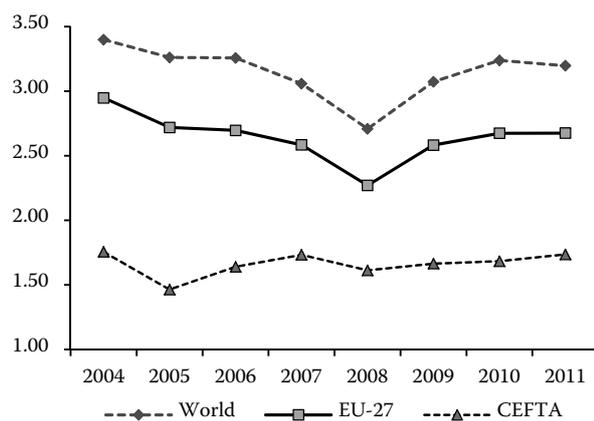


Figure 7. Index of comparative advantages of agri-food products of Serbia

Source: The authors' calculations on the basis of SORS and FAOstat (2015)

[[ $(e^{0.644348} - 1) \times 100 = 90.47\%$ ]. The SAA also has a positive impact on the export of agri-food products in the EU countries, which is, according to the results of the estimation of gravity model of the export of agri-food products, 49.81% [[ $(e^{0.404204} - 1) \times 100 = 49.81\%$ ].

### Comparative advantages of agri-food products

The index of comparative advantages of Serbian agri-food products was analysed both for the entire world market and for the most significant partners of Serbia in the foreign trade exchange – the EU and the CEFTA member states (Figure 7). Analysing the value index of comparative advantages of Serbia in the analysed period<sup>1</sup>, it can be concluded that Serbia had comparative advantages in the export of agri-food products, not only on the world market, but also on the markets of the EU and the CEFTA countries, due to the fact that the index of comparative advantages was higher than 1. The beginning of the economic crisis in 2008 had an influence on the decline of the value of comparative advantages' index of agri-food products, both on the world market and on the market of the analysed groups of countries.

Analysing the differences in comparative advantages by the groups of countries, it can be concluded that Serbia had significant comparative advantages in the export of agri-food products on the market of the EU during the analysed period. At the beginning of the

<sup>1</sup>The analyzed period, except in the case of the index of comparative advantages, is from 2004 to 2011, because of the availability of data in data base of the FAOstat.

global economic crisis in 2008, the index of comparative advantages of the export of agri-food products of Serbia on the EU market decreased, but conversely, the value of the export of agri-food products in these countries was permanently increasing. After 2008, the present increase of the index of comparative advantages of the export of these products on the EU market strengthened the position of the Serbian export on the market of these countries.

In the export of agri-food products on the market of the CEFTA countries, Serbia has a satisfactory level of comparative advantages, despite the fact that these countries have a similar trade structure as Serbia. In 2008, the economic crisis led to a slight decrease of the index of comparative advantages of agri-food products on the CEFTA market, but after that year, a continual increase is evident.

Using the modified index of comparative advantages, in order to realize which sections have larger comparative advantages both on the global market

and on the markets of the EU and the CEFTA countries, the comparative advantages of Serbian agri-food products within the particular sections are analysed (Table 3). Analysing comparative advantages on the global market and on the markets of the EU and the CEFTA countries in the period 2004–2013, it is noticed that the cereals and cereal preparations, sugars, sugar preparations and honey, fixed vegetable fats and oils, crude, refined, or fractioned had strong comparative advantages. The divisions live animals, beverages, hides, skins and fur skins, raw, vegetables and fruit, and dairy products and birds' eggs had significant comparative advantages within the Serbian agri-food products on the global market. The divisions with a satisfactory level of comparative advantages in the analysed period are: oil-seeds and oleaginous fruits, miscellaneous edible products and preparations, crude animal and vegetable materials, n.e.s, and animal oils and fats. In the analysed period, tobacco and tobacco manufactures, coffee, tea, cocoa, spices and

Table 3. Index of the revealed comparative advantages of Serbian agri-food products (average value in the period 2004–2013)

Section/division/group	Index of revealed comparative advantages		
	World	EU-27	CEFTA
<b>Food and live animals</b>	<b>3.4</b>	<b>4.1</b>	<b>1.9</b>
Live animals	5.3	0.1	4.9
Meat and meat preparations	2.8	0.5	1.8
Dairy products and birds' eggs	3.3	0.1	2.6
Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof	0.1	0.0	0.2
Cereals and cereal preparations	12.7	12.9	6.2
Vegetables and fruit	3.6	7.3	0.5
Sugars, sugar preparations and honey	8.9	13.3	1.6
Coffee, tea, cocoa, spices, and manufactures thereof	0.8	0.5	2.1
Feeding stuff for animals (not including unmilled cereals)	2.2	1.5	2.7
Miscellaneous edible products and preparations	1.5	0.4	1.6
<b>Beverages and tobacco</b>	<b>2.5</b>	<b>0.9</b>	<b>1.5</b>
Beverages	4.7	1.1	2.1
Tobacco and tobacco manufactures	0.9	0.8	0.5
<b>Crude materials, inedible, except fuels</b>	<b>1.7</b>	<b>1.6</b>	<b>1.0</b>
Hides, skins and fur skins, raw	3.6	1.9	2.2
Oil-seeds and oleaginous fruits	1.7	4.6	0.3
Crude animal and vegetable materials, n.e.s	1.3	0.6	3.9
Silk, cotton, jute, vegetable textile fibres, wool and other animal hair	0.7	1.3	0.4
<b>Animal and vegetable oils, fats and waxes</b>	<b>5.8</b>	<b>5.1</b>	<b>8.7</b>
Animal oils and fats	1.1	0.6	3.9
Fixed vegetable fats and oils, crude, refined, or fractioned	6.8	6.5	8.3
Animal or vegetable fats and oils, processed	2.3	0.1	40.0

Source: The authors' calculations on the basis of SORS (2015)

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manufactures thereof, silk, cotton, jute, vegetable textile fibres and wool, and other animal hair, fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof have not the satisfactory level of comparative advantages within the Serbian agri-food products on the global market.

The following divisions of the Serbian agri-food products had strong comparative advantages on the EU market in the period 2004–2013: sugars and sugar preparations, cereals and cereal preparations, vegetables and fruit, as well as fixed vegetable fats and oils, crude, refined, or fractioned. On this market, the divisions: hides, skins and fur skins, raw, feeding stuff for animals (not including unmilled cereals), silk, cotton, jute, vegetable textile fibres and wool, and other animal hair, and beverages had a satisfactory level of comparative advantages.

On the market of the CEFTA countries, the divisions animal or vegetable fats and oils, processed, fixed vegetable fats and oils, crude, refined, or fractioned, cereals and cereal preparations, live animals, crude animal and vegetable materials, n.e.s, as well as animal oils and fats had a strong level of comparative advantages of the Serbian agri-food products in the period 2004–2013. On the same market, the divisions feeding stuff for animals (not including unmilled cereals), dairy products and birds' eggs, hides, skins and fur skins, raw, coffee, tea, cocoa, spices and manufactures thereof, and beverages had the significant level of comparative advantages, whereas the divisions of meat and meat preparations, miscellaneous edible products and preparations, sugars, sugar preparations and honey had a satisfactory level of comparative advantages. The divisions which did not have com-

Table 4. Index of the revealed comparative advantages of Serbian agri-food products on the global market

Section/division/group	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Food and live animals</b>	<b>3.13</b>	<b>3.06</b>	<b>3.36</b>	<b>4.53</b>	<b>3.78</b>	<b>3.83</b>	<b>3.40</b>	<b>3.34</b>	<b>3.28</b>	<b>2.46</b>
Live animals	1.90	0.68	0.79	4.50	14.72	7.41	13.12	7.66	3.59	1.96
Meat and meat preparations	4.03	5.04	9.24	10.75	4.95	2.74	2.16	1.74	1.36	1.08
Dairy products and birds' eggs	1.44	2.20	7.48	5.93	5.31	5.80	2.42	2.65	2.71	2.06
Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof	0.03	0.10	0.10	0.13	0.22	0.14	0.09	0.08	0.07	0.08
Cereals and cereal preparations	4.23	10.31	11.63	15.18	11.69	16.02	15.78	14.65	16.44	9.19
Vegetables and fruit	4.91	3.81	3.48	4.61	3.75	3.55	3.40	3.67	3.12	2.99
Sugars, sugar preparations and honey	17.49	10.06	9.18	10.02	9.61	8.94	12.96	7.92	6.96	5.44
Coffee, tea, cocoa, spices and manufactures thereof	0.97	0.86	0.92	1.24	1.05	1.12	0.77	0.67	0.62	0.53
Feeding stuff for animals (not including unmilled cereals)	0.88	0.88	0.96	2.86	2.53	3.02	2.46	3.24	3.72	1.86
Miscellaneous edible products and preparations	1.25	1.11	1.70	2.34	2.21	2.00	1.35	1.26	1.35	1.31
<b>Beverages and tobacco</b>	<b>1.05</b>	<b>1.11</b>	<b>1.45</b>	<b>4.20</b>	<b>5.13</b>	<b>4.06</b>	<b>2.29</b>	<b>2.33</b>	<b>2.52</b>	<b>2.13</b>
Beverages	3.84	3.98	3.36	5.40	6.61	5.85	4.62	4.45	4.43	3.65
Tobacco and tobacco manufactures	0.20	0.10	0.28	1.98	2.55	1.98	0.88	0.85	1.11	1.16
<b>Crude materials, inedible, except fuels</b>	<b>2.17</b>	<b>2.17</b>	<b>1.82</b>	<b>1.87</b>	<b>1.68</b>	<b>1.28</b>	<b>1.40</b>	<b>2.01</b>	<b>1.37</b>	<b>1.83</b>
Hides, skins and fur skins, raw	18.53	19.87	34.36	24.28	7.20	3.56	2.99	2.69	1.85	1.78
Oil-seeds and oleaginous fruits	1.55	1.99	1.29	1.27	1.29	0.92	1.27	2.55	1.27	2.71
Crude animal and vegetable materials, n.e.s	1.69	1.50	1.29	1.34	1.41	1.40	1.06	1.27	1.19	1.06
Silk, cotton, jute, vegetable textile fibres, wool and other animal hair	0.51	0.52	0.36	0.48	0.43	0.41	0.78	1.39	1.00	1.00
<b>Animal and vegetable oils, fats and waxes</b>	<b>11.44</b>	<b>5.20</b>	<b>1.59</b>	<b>7.40</b>	<b>6.81</b>	<b>5.18</b>	<b>6.03</b>	<b>7.53</b>	<b>6.76</b>	<b>3.89</b>
Animal oils and fats	1.81	0.97	1.75	1.90	1.07	0.79	0.86	1.23	0.98	0.68
Fixed vegetable fats and oils, crude, refined, or fractioned	15.25	6.84	1.63	8.44	7.91	6.24	7.29	8.80	7.79	4.36
Animal or vegetable fats and oils, processed	2.24	1.29	1.26	2.90	2.91	1.51	1.53	3.40	3.80	2.99
<b>Total</b>	<b>2.83</b>	<b>2.76</b>	<b>2.84</b>	<b>4.37</b>	<b>3.85</b>	<b>3.67</b>	<b>3.13</b>	<b>3.23</b>	<b>3.09</b>	<b>2.42</b>

Source: The authors' calculations on the basis of SORS (2015)

parative advantages, both on the global market and on the markets of the EU and the CEFTA countries, were tobacco and tobacco manufactures, as well as fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof.

Considering the trend of the index of comparative advantages of Serbian agri-food products on the global market in the period 2004–2013 (Table 4), it can be concluded that the following divisions permanently had strong comparative advantages: cereals and cereal preparations, sugars, sugar preparations and honey, vegetable and fruits, and beverages. On the contrary, during the analysed period, fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof, as well as silk, cotton, jute, vegetable textile fibres, wool and other animal hair did not have comparative advantages. Coffee, tea, cocoa, spices and manufactures thereof, and tobacco and tobacco manufactures also did not have comparative advantages, except in particular years, when the index of comparative advantages was slightly higher than 1.

### Index of intra-industry trade in agri-food products

In order to determine the level of specialization of the intra-industry trade both on the global market, and on the markets of the EU and the CEFTA countries, the value of index of intra-industry trade in Serbian agri-food products in the period 2004–2013 is analysed (Figure 8). Analysing the values of the index of the intra-industry trade, it can be concluded that the intra-industry specialization is dominant not only on the global market, but also on the markets of the EU and the CEFTA countries. The high values of the index of the intra-industry trade in agri-food products are indicators of the specialization of foreign trade, as well as of the high level of integration of the market of these Serbian products with the global market, and markets of the EU and the CEFTA countries.

The highest level of specialization on the global market, i.e. the highest value of the index of intra-industry trade, had the section of crude materials,

Table 5. Index of the intra-industry trade in agri-food products of Serbia (average value in the period 2004–2013)

Section/division/group	Index of intra-industry trade		
	World	EU-27	CEFTA
<b>Food and live animals</b>	<b>71.72</b>	<b>64.47</b>	<b>43.62</b>
Live animals	52.22	11.65	19.38
Meat and meat preparations	80.46	43.48	45.00
Dairy products and birds' eggs	72.27	9.00	33.12
Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof	10.39	1.06	48.92
Cereals and cereal preparations	25.69	26.06	15.55
Vegetables and fruit	68.57	41.91	99.29
Sugars, sugar preparations and honey	35.00	25.35	48.72
Coffee, tea, cocoa, spices and manufactures thereof	60.42	40.97	39.69
Feeding stuff for animals (not including unmilled cereals)	91.17	88.22	32.33
Miscellaneous edible products and preparations	89.57	37.41	48.27
<b>Beverages and tobacco</b>	<b>86.15</b>	<b>65.85</b>	<b>50.82</b>
Beverages	57.27	73.35	40.15
Tobacco and tobacco manufactures	66.84	60.20	99.67
<b>Crude materials, inedible, except fuels</b>	<b>96.14</b>	<b>89.52</b>	<b>66.77</b>
Hides, skins and fur skins, raw	68.15	99.32	38.76
Oil-seeds and oleaginous fruits	95.69	59.24	78.83
Crude animal and vegetable materials, n.e.s	80.53	46.24	23.83
Silk, cotton, jute, vegetable textile fibres	54.15	79.42	89.05
<b>Animal and vegetable oils, fats and waxes</b>	<b>48.66</b>	<b>54.72</b>	<b>11.30</b>
Animal oils and fats	72.32	49.25	23.85
Fixed vegetable fats and oils, crude, refined, or fractioned	43.22	45.83	11.85
Animal or vegetable fats and oils, processed	89.49	11.20	2.58

Source: The authors' calculations on the basis of SORS (2015)

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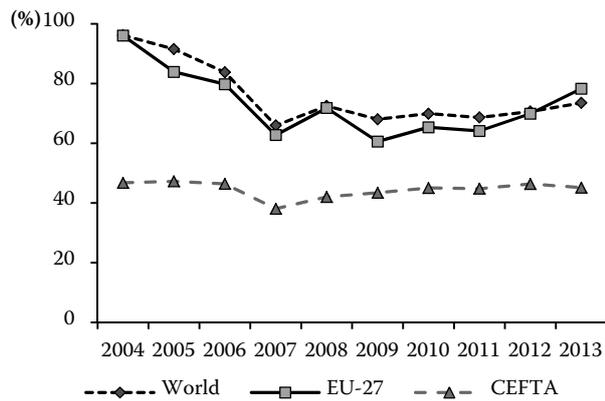


Figure 8. Index of the intra-industry trade of agri-food products of Serbia

Source: The authors' calculations on the basis of the SORS (2015)

inedible, except fuels (Table 5). The division of oil-seeds and oleaginous fruits was the most significant one inside this section with the value of the index of intra-industry trade of 95.69%. It was followed by the section of beverages and tobacco, and then, by the food and live animals, out of which the division of the feeding stuff for animals (not including unmilled cereals), with the value of index larger than 91%, represented the most important division. The lowest value of the index of the intra-industry trade had the division of fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof.

The level of the intra-industry trade in agri-food products within the main foreign trade partners of Serbia significantly differs. The highest level of specialization, i.e. the highest value of the index of

Table 6. Index of the intra-industry trade in agri-food products of Serbia on the global market

Section/division/group	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Food and live animals	98.7	86.4	75.8	64.4	73.3	66.2	66.2	<b>67.1</b>	<b>67.9</b>	<b>72.7</b>
Live animals	76.6	45.3	55.8	64.6	25.9	40.7	22.7	36.1	63.9	83.7
Meat and meat preparations	86.2	63.2	36.3	33.3	61.3	81.7	87.6	98.6	89.5	86.9
Dairy products and birds' eggs	64.1	97.0	43.0	53.2	58.4	49.2	82.0	77.8	76.7	81.3
Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof	2.2	7.9	9.2	11.6	18.1	13.6	10.3	8.8	8.4	11.3
Cereals and cereal preparations	83.8	36.9	29.9	24.8	31.6	21.2	19.3	20.6	18.6	26.6
Vegetables and fruit	76.6	76.0	74.1	63.6	73.8	69.6	66.2	63.0	70.2	64.0
Sugars, sugar preparations and honey	29.7	37.6	36.5	35.3	37.1	35.0	23.0	35.1	39.0	41.1
Coffee, tea, cocoa, spices and manufactures thereof	48.3	54.0	61.8	73.0	65.0	74.1	62.9	56.8	53.7	54.6
Feeding stuff for animals (not including unmilled cereals)	44.6	54.9	63.8	85.7	92.8	77.0	81.1	68.4	62.3	86.0
Miscellaneous edible products and preparations	58.1	64.7	90.6	95.7	99.5	97.2	89.0	85.4	89.1	96.6
<b>Beverages and tobacco</b>	<b>51.3</b>	<b>64.4</b>	<b>82.9</b>	<b>67.7</b>	<b>59.9</b>	<b>63.6</b>	<b>84.7</b>	<b>83.9</b>	<b>80.2</b>	<b>79.6</b>
Beverages	88.5	73.9	75.7	57.0	49.8	48.9	53.4	54.9	55.1	55.6
Tobacco and tobacco manufactures	12.2	8.3	24.0	96.0	92.4	97.8	68.5	67.2	79.6	90.2
<b>Crude materials, inedible, except fuels</b>	<b>83.0</b>	<b>96.3</b>	<b>94.0</b>	<b>93.0</b>	<b>86.7</b>	<b>80.7</b>	<b>90.9</b>	<b>91.2</b>	<b>89.7</b>	<b>86.9</b>
Hides, skins and fur skins, raw	28.3	21.0	11.3	16.3	46.7	69.5	71.9	77.1	95.3	88.4
Oil-seeds and oleaginous fruits	67.4	92.0	77.4	74.4	74.0	65.3	86.2	79.6	86.1	68.4
Crude animal and vegetable materials, n.e.s	71.3	78.3	77.4	76.9	78.3	85.1	77.3	86.0	82.7	85.9
Silk, cotton, jute, vegetable textile fibres, wool and other animal hair	28.6	36.7	29.6	36.3	32.7	35.7	63.1	90.3	74.3	83.1
<b>Animal and vegetable oils, fats and waxes</b>	<b>42.1</b>	<b>61.9</b>	<b>87.5</b>	<b>45.0</b>	<b>48.7</b>	<b>53.5</b>	<b>43.6</b>	<b>36.6</b>	<b>39.9</b>	<b>53.1</b>
Animal oils and fats	74.4	58.8	92.0	93.7	65.8	59.0	67.4	84.3	73.6	65.3
Fixed vegetable fats and oils, crude, refined, or fractioned	33.3	50.9	88.6	40.6	43.4	46.6	37.5	32.2	35.6	48.7
Animal or vegetable fats and oils, processed	84.7	71.3	76.0	85.2	85.9	88.8	95.4	66.3	61.5	64.0
<b>Total</b>	<b>96.20</b>	<b>91.55</b>	<b>83.78</b>	<b>65.97</b>	<b>72.51</b>	68.03	69.89	68.65	70.62	73.51

Source: The authors' calculations on the basis of SORS (2015)

intra-industry trade on the EU market has the section of crude materials, inedible, except fuels, and it is followed by the section of beverages and tobacco and food and live animals. On the CEFTA market, the values of the index of intra-industry trade are drastically lower than on the global market, and they are lower even than the values of this index for the EU market. The only exceptions are the divisions of tobacco and tobacco manufactures (99.67%) and vegetables and fruit (99.29%), which have extremely high values of the index of intra-industry trade.

The tendencies of the index of intra-industry trade in agri-food products of Serbia on the global market are shown in the Table 6. The higher value of the index of intra-industry trade draws to the conclusion that Serbian economy is a competent participant in the agri-food products' exchange on the global market.

## CONCLUSION

As far as the achieved liberalization of the market in the foreign trade exchange of Serbian agri-food products with the EU and the countries of the region is concerned, in the last decade, the significant results have been achieved. Under the influence of the signed free trade agreement (with the EU and the CEFTA countries), a partial change in the orientation of the Serbian agri-food products' export, as well as an intensification of the foreign trade trends, took place, which is represented by the empirical results in this paper. The results of the estimation of the gravity model of the export of agri-food products show that the CEFTA Agreement had an effect on the increase of export of agri-food products in these countries, in average by 90.47%, whereas the SAA had an impact on the increase of the export of agri-food products in the EU countries, in average by 49.81%.

Serbia has comparative advantages in the export of agri-food products, both on the global market, and on the market of the EU countries. On the CEFTA market, even though these countries have a similar structure of trade as Serbia, Serbia has a satisfactory level of comparative advantages. The largest comparative advantages on the global market have the products of a lower processing phase, i.e. cereals and cereal preparations, sugars, sugar preparations and honey, and fixed vegetable fats and oils. Analysing the values of the index of intra-industry trade in agri-food products, it can be concluded that the intra-industry trade in agri-food products

prevails not only on the global market, but also on the markets of the EU and the CEFTA countries. The high values of the index of intra-industry trade in agri-food products is an indicator of the foreign trade exchange specialization and of the high level of the integration of market of these products with the global market, and with the markets of the EU and the CEFTA countries. The further results in the foreign trade exchange of the agri-food products depend on the ability of this sector to respond to the demands for the development of the competitiveness of the products, especially on those connected with the security and quality standards. In that context, a very significant condition for the achievement of the particular positions on the international market will be the organized appearance of the products with the comparative advantages.

Trade liberalization, in terms of the achieved trade agreements with the EU and the CEFTA, has significant positive effects on the performances of the export of agri-food products from Serbia. This is, primarily, reflected in a continuous increase of the agri-food export, as well as in the increase of the net export within this section. Strengthening of exporting performances and the consequences of the suspension of trade barriers on border are reflected in the increase of comparative advantages, primarily in the crop production. The crop sector represents the basis of expansion of the Serbian agri-food export, as well as the section with the highest level of specialization in the export of agri-food products. Ultimately, it can be concluded that Serbian position in the food export, both in comparison with the EU and the CEFTA countries, has been strengthened by processes of trade liberalization. Namely, the creation of the free trade zone, i.e. the creation of exporting opportunities, is very important for the productive potential of agriculture, which Serbia possesses, because it represents a significant determinant of the complete agri-food development. Additionally, in future studies, it would be desirable to estimate the gravity model of sectors with biggest comparative advantages, in order to identify the potentials for the export growth.

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