

The competitiveness and comparative advantage of the Slovak and the EU agri-food trade with Russia and Ukraine

Konkurencieschopnosť a komparatívne výhody agroobchodu Slovenska a EÚ s Ruskom a Ukrajinou

A. QINETI¹, M. RAJCANIOVA¹, E. MATEJKOVA²

¹*Department of Economics, Faculty of Economics and Management, Slovak University of Agriculture, Nitra, Slovak Republic*

²*Department of Statistics and Operation Research, Faculty of Economics and Management, Slovak University of Agriculture, Nitra, Slovak Republic*

Abstract: The paper investigates comparative advantages and competitiveness of Slovak and the EU 27 agri-food trade in markets of two countries: Russia and Ukraine. Our aim is to see the dynamics of the agri-food trade for the analyzed countries especially in the post-accession period. Applying a trade dataset from the EUROSTAT and based on the approach applied by Bojnec and Fertő (2006), we describe the pattern of agri-food trade in Slovakia and the EU using the Balassa index. The extent of trade specialization exhibits a declining trend in the country. It has lost comparative advantage for a number of product groups over time. The indices of specialization have tended to converge. For the particular product groups, the indices display a greater variation. They are stable for the product groups with comparative disadvantage, but the product groups with strong comparative advantage show a significant variation. There are also shown different tendencies for different markets i.e. the trade patterns between the Slovak Republic and the EU 27 with Russia and Ukraine.

Key words: comparative advantage, agri-food trade, EU 27, Slovak Republic, Russia, Ukraine

Abstrakt: Príspevok sa zaoberá analýzou komparatívnych výhod a konkurencieschopnosti obchodu s agropotravinárskymi komoditami Slovenska a EÚ 27 s krajinami Rusko a Ukrajina. Naším cieľom je odhaliť dynamiku obchodu s agropotravinárskymi komoditami zvlášť v kontexte analyzovaných krajín. Pri realizácii výskumu sme vychádzali z údajovej databázy EUROSTAT. Využili sme metodický rámec aplikovaný v Bojnec a Fertő (2006), Balassov index pri analýze obchodu s agropotravinárskymi komoditami na Slovensku a v EÚ. Naše výsledky ukázali, že rozsah špecializácie v obchode mal klesajúcu tendenciu, v priebehu sledovaného obdobia sme stratili komparatívne výhody u množstva produktov. Index špecializácie preukázal konvergujúce tendencie. Pri vybraných skupinách produktov je možné sledovať väčšie odchýlky. Hodnoty indexu sú stabilné pre skupiny výrobkov bez komparatívnej výhody, avšak hodnoty u skupín výrobkov s komparatívnou výhodou vykazujú signifikantné kolísanie. Tieto tendencie sa líšia aj v závislosti od rôznych trhov, napr. trhový model medzi SR a EÚ 27 s Ruskom a Ukrajinou.

Kľúčové slová: komparatívna výhoda, obchod s agropotravinárskymi komoditami, EÚ 27, Slovenská republika, Rusko, Ukrajina

Slovakia passed through a long-term process of transformation since it split from the Czechoslovak Federation state. The country is characteristic by

the small size of its economy, focused mainly on the internal markets. Trade flaws regarding the agri-food commodities were until the accession into the

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EU limited because of the existing different tariff and non-tariff barriers (Bielik a kol. 1999; Bielik, Hupková 2008). The accession meant for both countries increasing opportunities for the agro-trade in the framework of the common market, but also an increasing competition for domestic producers. This can be reflected in different aspects like prices, quality, marketing, etc. This might have caused the weakening demand for the domestic agri-food products in line with the domestic consumer preferences. Many authors consider the ability of a successful adaptation to the foreign markets as a sign of competitiveness (Pokrivcak, Ciaian 2004; Ciaian, Swinnen 2006; Pokrivčák, Drábik 2008; Pokrivčák 2009; Qineti et al. 2009). For all the above mentioned reasons and facts, the analysis of the trends in export competitiveness is useful because it might help to find the potential problems for different branches of the agri-food sector and propose suitable solutions for the future (Ciaian, Pokrivcak 2007; Bojnec, Ferto 2006; EU-Commission 1999; Ferto, Hubbard 2003).

CONCEPTS AND METHODOLOGY

Competitiveness can be analyzed at three different levels: (i) competitiveness of nations (macroeconomic level); (ii) competitiveness of industries (mesoeconomic level); and (iii) competitiveness of firms (microeconomic level). Another aspect of competitiveness exists with regard to the spatial dimension of the investigation. Competitiveness of enterprises can be compared within a region of a particular country, or among countries (Bojnec, Ferto 2006).

There are different approaches that help to evaluate the competitiveness at the national level. One way is the analysis of comparative advantages that assumes that international trade exchanges happen due to the differences in the **relative opportunity costs between** trade partners. However, there is a difference between the conception of comparative advantage and competitiveness. The first difference arises from trade distortions that are included into the concept of competitiveness but that are not part of comparative advantage. Other differences have been identified by other authors (Lafay 1992). Competitiveness usually compares countries regarding the same selected groups of commodities while comparative advantage is comparing different groups of commodities. Also, competitiveness is vulnerable to changes in macroeconomic variables while comparative advantages have a natural structural character.

The export comparative advantages of Slovakia and the EU 27 are analyzed in relation to the markets of Russia and Ukraine.

The nature of comparative advantage in trade data are the main methodological approaches that are applied in this paper. The concept of the '**revealed**' comparative advantage, introduced by Liesner (1958) but refined and popularized by Balassa (1965) and therefore known as the '**Balassa index**', is widely used empirically to identify a country's **weak and strong** export sectors. Porter (1990) uses it to identify strong sectoral clusters, Amiti (1998) analyses the **specialization patterns in Europe** (Proudman, Redding 2000).

The Revealed Comparative Advantage (RCA) index is defined by Balassa (1965) as follows:

$$B = \frac{\frac{x_{ij}}{x_{rj}}}{\frac{x_{is}}{x_{rs}}} \quad (1)$$

where x represents exports, i is a commodity, j is a country, r is a set of commodities and s is a set of countries. B is based on observed trade export patterns; it measures a country's **exports of a commodity** relative to its total exports and to the corresponding export performance of a set of countries. If $B > 1$, then a comparative advantage is revealed, i.e. a sector in which the country is relatively more specialized in terms of exports. In our case, x_{ij} describes Slovak or the EU 27 exports for a particular product group to Russia and Ukraine, while x_{is} is the **total agri-food** of Slovak Republic and EU 27. x_{rj} denotes the Slovak and EU exports for a given product to the world and x_{rs} the **total agri-food exports by Slovakia and the EU 27 to the world**.

Our paper is focused on the stability of the B trade indices over time. There can be distinguished at least two types of stability according to Hinloopen and van Marrewijk (2001): (i) stability of the distribution of the indices from one period to the next; and (ii) stability of the value of the indices for particular product groups from one period to the next.

In our paper, we analyze the first type of stability in the following way: following Dalum et al. (1998), we use B in regression analysis:

$$B_{ij}^{t2} = \alpha_i + \beta_i B_{ij}^{t1} + \varepsilon_{ij} \quad (2)$$

where superscripts $t1$ and $t2$ describe the start year and the end year, respectively. The dependent variable, the value of B at time $t2$ for sector i in country j , is tested against the independent variable which is the value of B in year $t1$; and α and β standard linear regression parameters and ε is a residual term. If $\beta = 1$, then this suggests an unchanged pattern of B between periods $t1$ and $t2$. If $\beta > 1$, the existing spe-

cialization of the country is strengthened. If $0 < \beta < 1$, then commodity groups with low (negative) initial B indices grow over time, while product groups with high (positive) initial B indices decline. The special case is where $\beta < 0$ indicates a change in the sign of the index. However, Dalum et al. (1998) point out that $\beta > 1$ is not a necessary condition for growth in the overall specialization pattern. Thus, following Cantwell (1989), they argue that:

$$\frac{\sigma_i^{t2}}{\sigma_i^{t1}} = \frac{|\beta_i|}{|R_i|} \quad (3)$$

where R is the correlation coefficient from the regression and s^2 is the variance of the dependent variable. It follows that the pattern of a given distribution is unchanged when $\beta = R$. If $\beta > R$ the degree of specialization has grown, while if $\beta < R$ the degree of specialization has fallen.

DATA AND EMPIRICAL RESULTS

For the purposes of empirical analysis on trade types of bilateral Slovak and the EU 27 agri-food trade

with Russia and Ukraine, we use trade data from the EUROSTAT by the years 1999–2006. The sample consists of 201 items at four-digit level.

General overview of Slovak agro-trade with Russia and Ukraine

The agri-food export of the Slovak Republic with Ukraine in the last three years has been falling. In 2004, i.e. upon the Slovakia accession into the EU, the lowest level of import has been achieved at the value of 41 997.64 million SKK. The highest import level has been achieved in 2006 (477 306 million SKK). Exports reached the lowest level in 2008 (at 387 317 million SKK) while the highest level has been reached in 2004 (at 537 151.7 million SKK). Export has been showing falling tendencies in the last three years. Only in 2006, the Slovak agro-trade balance with Ukraine was negative, otherwise exports exceeded imports (Figure 1).

The Slovak agri-food trade balance with the Russian Federation has been always positive. Exports reached the highest level in 2003 (921 103.5 million SKK)

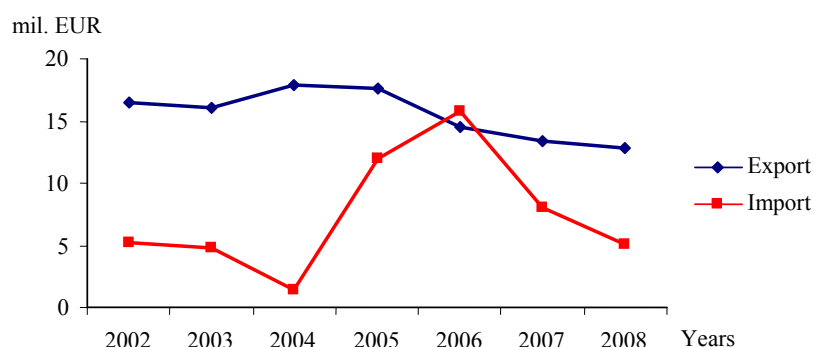


Figure 1. Agri-food trade of the Slovak Republic and the Ukraine in mil. EUR

Source: www.radela.sk/rezort, own calculation

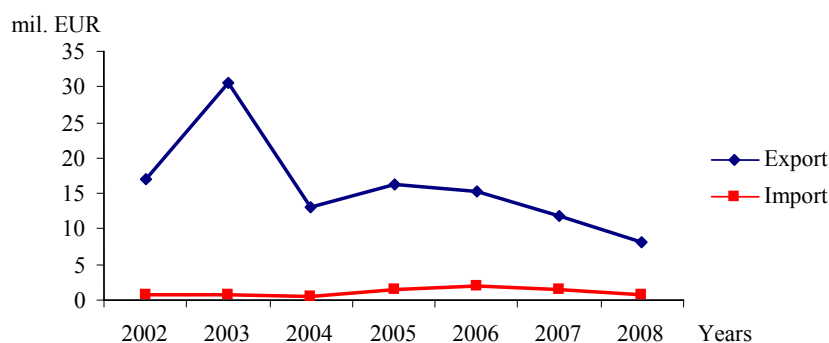


Figure 2. Agri-food trade of the Slovak Republic and the Russian Federation in mil. EUR

Source: www.radela.sk/rezort, own calculation

while the lowest level has been reached in 2008 (at 241 632 million SKK). Since 2005, Slovak agri-food exports to the Russian Federation have been falling. Regarding imports, they reached the lowest level in 2008 (at 25 404 million SKK) and the highest level in 2005 (at 45 734 million SKK). Since 2006, imports too, have a falling tendency (Figure 2).

Table 1. Development of the Balassa index for selected commodity groups: Slovak Republic – Russian Federation

Commodity group	<i>B</i> 2006	D06/02	D06/04
101	69.3557	58.96746	57.62144
404	17.91695	17.91695	-10.3985
602	228.7713	228.7713	180.004
902	3.734082	-11.4505	0.411299
1209	109.3521	109.3521	108.8196
2008	8.613942	-148.228	8.613942
2007	39.53785	-34.4867	5.402005

Source: own calculation, data from the EUROSTAT and the International Trade Centre

Table 2. Development of the Balassa index for selected commodity groups: EU 27 – Russian Federation

Commodity group	<i>B</i> 20006	D06/02	d06/04
103	1.940632793	4.33204	0.120058
201	4.551141836	-4.72859	0.579604
203	2.359241481	1.015881	1.244492
207	1.753001994	-0.59705	0.255735
306	2.228489062	0.154164	-0.47484
410	0.080885468	-1.43533	0.047385
702	3.636090784	1.788739	0.444509
710	2.478267948	1.495826	0.445783
809	4.397367127	1.191062	-0.0549
903	4.033140693	1.048901	-1.42986
1002	0.011107348	1.143247	-1.21206
1207	3.000217553	2.069766	0.64701
1402	3.659761345	-1.11829	-204.891
1511	5.531741366	3.092743	1.089318
1522	1.084834572	1.084835	1.084835
2305	6.660577945	5.778365	6.660578

Source: own calculation, data from EUROSTAT and International Trade Centre

The analysis of the Slovak and the EU 27 agro-trade with Russia and Ukraine

The analysis of export comparative advantages of the Slovak and the EU 27 agro-trade with the Russian Federation

The analysis of export comparative advantages is based on the data from the Balassa index. The Table 1 shows the Balassa index on the Slovakia-Russia agri-food trade:

Between these two countries, positive changes have been identified for the period 2002–2006 for more than 25 commodity groups, for the others, negative changes have been identified. For the commodity group 404 – sugar, malt and other milk products, the values have been changing so that export has been falling in 2006 comparing to 2004. The opposite changes were identified for the commodity group 902 – Tea, as well as 2008 – Fruits, nuts, other processed fruit.

In general, the best values of *B* indexes were reached in 2006. The Slovakia accession into the EU brought to fall the *B* indexes for commodity groups: 101, 1107 (malt), 1805 (cocoa powder without sugar), 1904 (cereal products), 2104 (ingredients for soups, bouillons, etc.). On the other hand, positive changes have been registered for commodity groups 402 (milk, yoghurts), 403, 405 (cow milk butter and other butters, milk fat, 808 – apples, pears and other fresh fruits, 2103 (ingredients for sources, etc.).

In fact, for more than 100 commodity groups, positive changes of *B* indexes were registered for the analysed period.

In the Table 2, the data on the agri-food trade between the EU 27 and the Russian Federation are presented:

In the post enlargement period, positive changes have been identified for the commodity groups 102 (live cattle), 103 (live pigs), 105 (live chicken), 1207 (other oilseeds). On the other hand, negative changes have been identified for commodity groups 204 (live sheep), 209 (pork bacon, fat, fresh and frozen), 403 (yoghurts).

Further, we analyze the median values for *B* indexes, as well as the share of *B* indexes larger than one (i.e. cases where comparative advantages have been identified).

Based on the data, the conclusion about Slovakia and the EU 27 is that no comparative advantages have been identified in relation to the Russian Federation regarding the agri-food trade. The median value of *B* indexes in both cases is lower than one. Regarding the share of the commodity groups with *B* larger than one, the largest number of groups has been registered

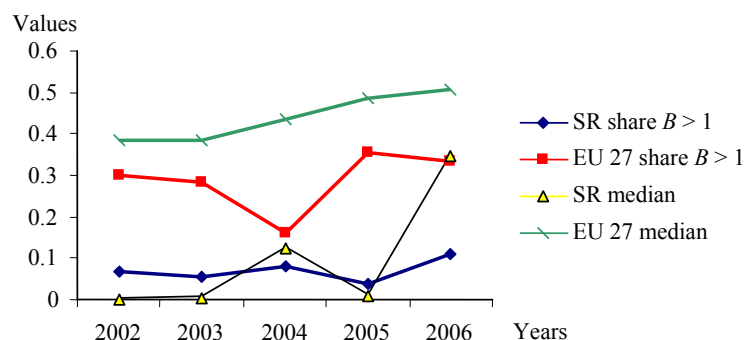


Figure 3. The median and the share of the commodity groups with the value $B > 1$: Slovak Republic and EU 27 to Russian Federation

Source: own calculation, data from the EUROSTAT and the International Trade Centre

in 2006, for Slovakia as well as for the EU 27. For Slovakia, from the total number of the analyzed items (204), only 22 had B indexes larger than one. In the case of the EU 27, out of 277 items, only 98 had B indexes larger than one in 2005. These were the years where the largest number of commodity groups with $B > 1$ has been identified (Figure 3).

As presented in the figure above, the median value of B indexes for the EU 27 have been increasing since the enlargement (2004) but the share of B indexes larger than one has been decreasing revealing the falling number of commodity groups with comparative advantage. The numbers for Slovakia reveal no straightforward tendencies: the median values of B indexes for Slovakia in the pre-accession period were low in 2004 they suddenly increased remarkably just to be followed by periodical increases and decreases. The share of groups with B indexes larger than one shows slightly increasing tendencies or better to say, it shows signs of stagnation in the number of groups with comparative advantages in the case of Slovakia.

The results of the regression analysis of the agro-trade between Slovakia and the EU 27 on one hand and the Russian Federation on the other are presented in the Table 3.

The value of β is between 0 and 1 for Slovakia and the EU 27, meaning that in both cases the agri-food

commodity groups with comparative advantages have been declining, revealing declining comparative advantages in agro-trade with Russia. The analysis of the regressor is not sufficient to conclude, as β may be significant while the coefficient of determination (R^2) may be low. So we look at the ratio between β and R , and as it shows values lower than 1 in both cases, the conclusion is that Slovakia and the EU 27, in the post accession period are losing comparative advantages in the agri-food trade with the Russian Federation.

The analysis of export comparative advantages of Slovak and the EU 27 agro-trade with Ukraine

In the Table 4, the most remarkable changes of the Balassa indexes are presented.

In the framework of the agro-trade between Slovakia and Ukraine, positive changes have been identified in the period 2006/2004 comparing to the period 2006/2002 for the commodity groups 106 (other live animals), 801 (coconuts, other nuts), 808 (apples, pears, etc.), 2106 (other food ingredients). On the other hand, negative changes have been identified for the commodity groups 2401 (ingredients for soups, bouillons, prepared soup homogeneous mixtures).

Based on the analysis of B indexes for the agro-trade between Slovakia and Ukraine, positive changes have been identified for the commodity groups 105 (live poultry), 303 (frozen fish excluding fish fillets and meat) 0304, 1601 (sausages, salami, etc.), 2103 (ingredients for sauces, etc.), 2208 (ethyl-alcohol < 80% of low density alcohol, distilled brandy). Negative changes have been identified for the commodity groups 203 (pork meat fresh, frozen), 704 (cabbage, cauliflower, etc.), 705 (lettuce and other fresh or frozen vegetables), 712 (dry vegetables, cut or powdered), 1805

Table 3. Stability of the B index between the years 2003 and 2006: SR, EU 27 with Russian Federation

	Beta	R^2	B/R	N
Slovak Republic	0.025748	0.003182	0.456456	204
EU 27	0.450525	0.371094	0.739566	277

Source: own calculation, data from the EUROSTAT and the International Trade Centre

Table 4. Development of the Balassa index for selected commodity groups: Slovak Republic – Ukraine

Commodity group	<i>B</i> 2006	d06/02	d06/04
105	1 746.666129	1 607.44477	1 424.334593
106	0.15359313	-6.121220211	0.15359313
207	203.2730625	203.167505	202.0106394
303	5.42895218	5.367416461	5.409480017
709	1.73550368	0.046338922	1.348012295
801	614.1754074	-962.9545304	408.1608964
808	42.97303725	-247.9978885	39.81991891
809	219.0847636	210.3018305	194.5751097
810	30.41046033	28.71639434	22.78326076
904	2.618412606	-0.731714112	1.773391539
1601	35.00764005	34.09771882	33.18476512
1804	59232.63751	59232.63751	59232.63751
2106	16.318006	-3.752819907	15.49510981
2204	6.341356998	6.340701947	2.563608414
2205	14.90407264	14.90407264	14.90407264
2208	5.341003098	4.800235803	3.727330223
2401	42.947721	0.575392628	-6.215157953

Source: own calculation, data from the EUROSTAT and the International Trade Centre

Table 5. Development of the Balassa index for selected commodity groups: EU 27 – Ukraine

Commodity group	<i>B</i> 2006	d06/02	d06/04
510	2.124454	2.805624	-9.47742
711	1.285424	-1.98274	2.380976
712	2.053784	2.265368	1.602916
804	2.480832	3.520415	2.590699
903	3.181183	3.625669	2.800197
1005	5.666629	10.76362	7.071662
1007	7.506115	8.091394	-3.85276
1514	0.03156	-2.40624	0.021531
1803	7.392275	15.66768	4.249264
1804	3.455533	3.46801	2.742109
2009	1.287367	1.89435	1.114225
2304	7.592467	1.531741	2.020339
2403	0.577668	1.631061	-0.23421

Source: own calculation, data from the EUROSTAT and the International Trade Centre

(cocoa powder without sugar), 1901 (malt liquid), 2309 (animal feed ingredients).

In both analyzed periods, negative changes have been identified for the commodity group 1805 (cocoa powder without sugar).

While comparing the Balassa indexes between the EU 27 and Ukraine, positive changes have been identified in the period 2006/2004 compared to the period 2006/2002 for the commodity groups 711 (temporary conserved vegetables not suitable for consumption), 1514 (rape oil, etc.). On the other hand, negative changes have been identified for the commodity groups 510, 1007 (malt), 2403 (other tobacco products and substitutes).

The EU enlargement had positive effects on the EU 27 exports to Ukraine for the commodity groups 105 (live poultry), 804 (dates, figs, avocado, mango, fresh or dry), 1105 (flour, cornflakes, potato granules, 1 05 (rape seeds), 1517 (butter, animal fats and vegetable oils). On the other hand, the enlargement affected negatively the commodity groups 407 (poultry eggs), 510, 1204, 1516 (fats, vegetable oils, etc.), 2302 (other mill products).

Similarly like in the case with Russian Federation, there have been analyzed the data on the calculated medians and the share of *B* indexes larger than 1 for Ukraine. Even in this case, decreasing comparative advantages on behalf of Slovakia and the EU 27 have been identified toward Ukraine. The value of median for *B* indexes has been lower than one for every year. Out of the 204 items of the agro-trade between Slovakia and Ukraine, the $B > 1$ has been identified for 40 commodity groups in 2002, and this was the maximal figure. Out of 276 analyzed items for the agro-trade between the EU 27 and Ukraine, the highest share of $B > 1$ has been noticed in 2006, the number of groups with comparative advantages was 93.

The Figure 4 above demonstrates that the median value of *B* for Slovakia shows falling tendencies while the same indicator for the EU slightly increases during the analyzed period. In the same fashion, the share of $B > 1$ falls in the case of Slovakia and slightly increases for the EU 27.

In the Table 6, the results of the regression analysis in the case of Ukraine are presented:

In the case of Slovak agro-export to Ukraine, the value of β is larger than one, meaning that the number of the commodity groups with $B > 1$ at the beginning of the analyzed period is supposed to increase over time. The ratio β/R is larger than one, meaning that the Slovakia agro-trade specialization toward Ukraine has been increasing, and so does its competitiveness in the field.

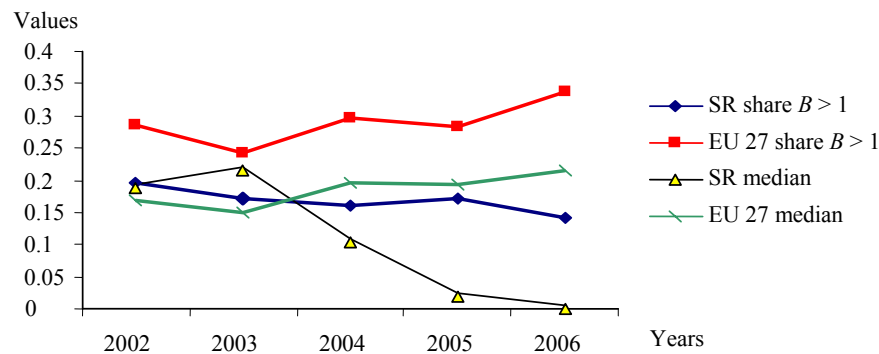


Figure 4. Median and share of the commodity groups with the value $B > 1$: Slovak Republic and EU 27 to Ukraine

Source: own calculation, data from EUROSTAT and International Trade Centre

In the case of the EU 27, the value of β is lower than one, meaning that the number of commodity groups with comparative advantages at the beginning of the analyzed period has been decreasing. The ratio of β/R is lower than one, i.e. $\beta < R$, meaning that the EU 27 agri-food trade specialization toward Ukraine has been decreasing, so that its competitiveness in the Ukrainian market is falling.

As shown also in the Table 7 (where a summary of the regression analysis is presented), we can characterise the agro-trade between Slovakia and the EU 27 with Russia as well as the agro-trade of the EU 27 with Ukraine as the trade of decreasing specialization. The situation is different only in the case of the agro-trade between Slovakia and Ukraine.

CONCLUSIONS

Among the most important agricultural products in Ukraine, there could be ranked cereals, sunflower, sugar beet, vegetables, beef meat and milk.

Table 7. Structural stability of trade specialisation

Country	Indicator	Russia	Ukraine
SR	R^2	0.003182	0.001939
	Beta	0.025748	1.499337
	B/R	0.456456	34.04518
	R	0.056409	0.04404
EU 27	R^2	0.371094	0.013946
	Beta	0.450525	0.066084
	B/R	0.739566	0.559584
	R	0.609175	0.118094

Source: own calculation, data from EUROSTAT and International Trade Centre

The agricultural exports are concentrated on 3 main commodities representing 60% of the total agricultural exports. These commodities are cereals, animal fat and vegetable oil. The most important imported commodities are tobacco, food ingredients, cocoa and its products. The most important trade partners are the CIS, the EU 27 and Asian countries.

The EU 27 is the main supplier of agri-food products for Ukraine, followed by the CIS. The EU exports to Ukraine mainly food products, tobacco, meat and meat products, while the CIS exports meat, fish and milk products, alcohol and non-alcoholic beverages, sweets and candies. Asian countries export to Ukraine mainly animal fats and vegetable oils, as well as fruits and vegetables.

Slovak agri-food exports to Ukraine in the post-EU enlargement period have been falling, the imports as well. It is interesting to notice that the highest export values have been registered in 2006, but they have been falling since then. In general, Slovak agri-food trade balance with Ukraine is positive.

The main agri-food exporter to the Russian Federation is the EU. Russia is the third most important trade partner for the EU. Russia exports to the EU countries mainly raw material and agricultural products.

Slovak agri-food exports to the Russian Federation have been falling since 2004 while imports have been increasing since the EU accession.

Based on the results of the analysis of the Balassa indexes, the largest number of commodity groups with comparative advantages regarding Slovak trade with Russia has been identified in 2006. For 22 out of 204 agri-food commodity groups, comparative advantages have been revealed, while in the case of the EU 27, for 98 groups out of 277 comparative advantages were found.

The median value of the Balassa indexes for the agri-trade between the EU 27 and Russia has been

increasing since the enlargement wave in 2004. The Slovak median was at a low level in the pre-accession period, it increased in 2004 to fall again in the post-accession period.

Based on the regression analysis of the Balassa indexes, we can conclude that the degree of specialization in the agro-trade between Slovakia and the European Union in one hand, and Russia in the other has been decreasing. The number of the commodity groups with a comparative advantage has been declining since the enlargement. It is interesting to notice that the competitiveness of the Slovak and the EU 27 agri-food commodities in the Russian market has been falling since the accession.

Similarly, in the article we analyze the situation of the agro-trade with Ukraine. Based on the results of the analysis of the Balassa indexes, the largest number of commodity groups with comparative advantages regarding the Slovak trade with Ukraine has been identified in 2002. For 40 out of 204 agri-food commodity groups, comparative advantages have been revealed, while in the case of the EU 27, for 93 groups out of 276 comparative advantages were found in 2006.

The median value of the Balassa indexes for the agro-trade between the EU 27 and Ukraine has been slightly increasing since the enlargement wave in 2004, while the Slovak median has been decreasing.

Based on the regression analysis of the Balassa indexes, we can conclude that the degree of specialization in the agro-trade between Slovakia and the European Union in one hand, and Ukraine in the other had different developments. In the case of Slovakia, the number of commodity groups with comparative advantage has been increasing, while for the EU 27, they have been decreasing. The preliminary conclusion is that the competitiveness of the Slovak agri-food commodities in the Ukrainian market has been slightly increasing since the accession, while, on the contrary, the EU 27 shows the tendencies.

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Contact address:

Artan Qineti, Miroslava Rajcaniova, Eva Matejkova, Slovak University of Agriculture in Nitra, Tr. A. Hlinku 2, 949 76 Nitra, Slovak Republic
e-mail: qineti@yahoo.com; miroslava.rajcaniova@fem.uniag.sk; eva.matejkova@fem.uniag.sk
