

# **Selected Aspects of the Slovak and the EU agri-food trade with Russia and Ukraine**

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## **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 especially for specific agriculture commodities like milk and dairy products.

**Keywords:** comparative advantage, EU 27, Slovak Republic, Russia, Ukraine.

## **Introduction:**

Slovakia passed through a long-term process of transformation since it split from the Czechoslovak federation state. The country is characteristic for the small size of their economies, focused mainly on their internal markets. Trade flows regarding the agro- food commodities were until before accession into the EU limited because of existing different tariff and non-tariff barriers. Accession meant for both countries increasing opportunities for agro- trade in the framework of common market, but also increasing competition for domestic producers. This can be reflected in different aspects like prices, quality, marketing, etc. This might have caused weakening demand for domestic agro- food products in line with domestic consumer preferences. Many authors consider the ability of successful adaptation in the foreign markets as a sign of competitiveness (Pokrivcak, J., Ciaian, P. (2004); Ciaian, P., Swinnen, J.F.M. (2006); ). For all the above mentioned reasons and facts, the analysis of the trends in export competitiveness is useful because it might help to find potential problems for different branches of agro- food sector and propose suitable solutions for the future (Ciaian, P., Pokrivcak, J. (2007); Bojnec,S. and Ferto, I. (2006); EU-Commission (1999). ).

## **Material and Methods:**

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 regards to the spatial dimension of the investigation. Competitiveness of enterprises can be compared within a region of a particular country, or between countries. (Bojnec, Fertö – 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 differences in relative – opportunity costs between trade partners. However there is a difference between the conception of comparative advantage and competitiveness. 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, G., 1992). Competitiveness usually compares countries for the same selected groups of commodities while comparative advantage is estimated to compare 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 EU 27 are analyzed in relation to these markets 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 ‘revealed’ comparative advantage, introduced by Liesner, H.H (1958) but refined and popularized by Balassa, B. (1965) and therefore known as the ‘Balassa index’, is widely used empirically to identify a country’s weak and strong export sectors. Porter, M. (1990) uses it to identify strong sectoral clusters, Amiti, M. (1998) analyses specialization patterns in Europe, Proudman, J. and Redding, S. (2000).

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

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

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 EU 27 exports for a particular product group to Russia and Ukraine, while  $x_{is}$  is total agro- food of Slovak Republic and EU 27.  $x_{rj}$  denotes the Slovak and EU exports for a given product to the world and  $x_{rs}$  total agro- food exports by Slovakia and EU 27 to the world.

Our paper is focused on the stability of the  $B$  trade indices over time. One can distinguish at least two types of stability Hinloopen, J. and van Marrewijk, C. (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, B., Laursen, K. and Villumsen, G. (1998) we use  $B$  in regression analysis:

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

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  $\alpha$  are  $\beta$  standard linear regression

parameters and  $\varepsilon$  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 specialization 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, B., Laursen, K. and Villumsen, G. (1998) point out that  $\beta >1$  is not a necessary condition for growth in the overall specialization pattern. Thus, following Cantwell, J. (1989), they argue that:

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

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.

### **Results:**

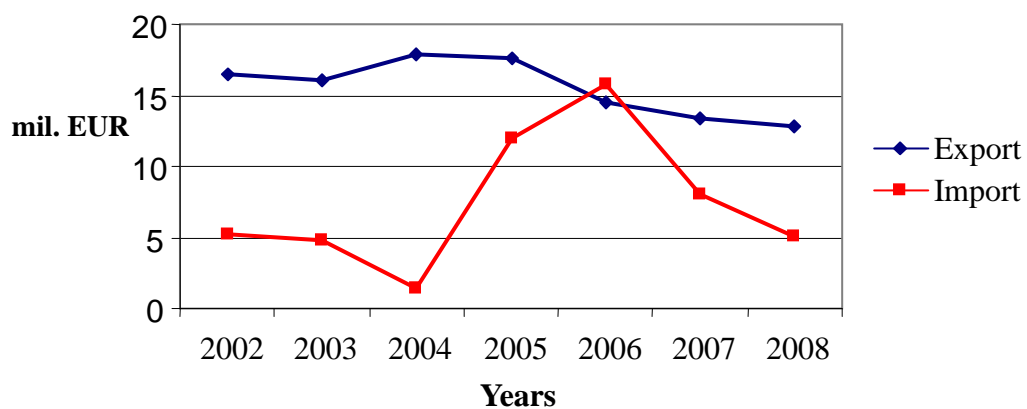
For the purposes of empirical analysis on trade types of bilateral Slovak and EU27 agro- food trade, with Russia and Ukraine, we use trade data from EUROSTAT by the years 1999 – 2006. The sample consists of 201 items at four- digit level.

### **General overview of Slovak agro-trade with Russia and Ukraine**

The agro-food export of Slovak Republic with Ukraine in the last three years has been falling. In 2004, i.e. upon Slovakia accession into EU, the lowest level of import has been achieved at

the value of 41997,64 millions SKK. The highest import level has been achieved in 2006 (477306 millions SKK). Exports reached the lowest level in 2008 (at 387317 millions SKK) while the highest level has been reached in 2004 (at 537151,7 millions 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.

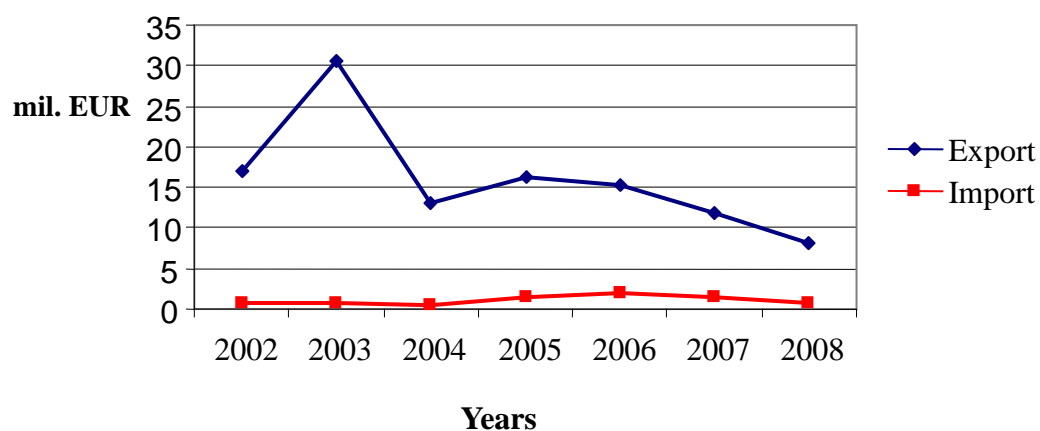
**Figure 1: Agro-food trade of Slovak republic and Unkraine in mil. EUR**



Source: [www.radela.sk/rezort](http://www.radela.sk/rezort), own creation

The Slovak agro-food trade balance with Russian Federation has been always positive. Exports reached the highest level in 2003 (921103,5 million SKK) while the lowest level has been reached in 2008 (at 241632 millions SKK). Since 2005, Slovak agro-food exports to Russian Federation has been falling. Regarding imports, they reached the lowest level in 2008 (at 25404 millions SKK) and the highest level in 2005 (at 45734 millions SKK). Since 2006 imports too, have falling tendency.

**Figure 2: Agro-food trade of Slovak republic and Russian Federation in mil. EUR**



Source: [www.radela.sk/rezort](http://www.radela.sk/rezort), own creation

### The Analysis of export comparative advantages of Slovak and EU 27 agro-trade with Russian Federation

The analysis of export comparative advantages is based on data from Balassa index.

The table below shows the Balassa index on Slovakia-Russia agro-food trade:

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

Commodity group	B 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 EUROSTAT and International Trade Center

Between these two countries, positive changes has been identified for the period 2002-2006 for more than 25 commoditz groups, for the others negative changes have been identified. For the commodity group 404 – like sugar, malt and other milk products, the values have been changing so that exporta have 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. Slovakia accession into EU brought to fall B indexes for commodity groups like: 101 , 1107 (malt ), 1805 (cocoa powder without sugar), 1904 (cereal products), 2104 (ingredients for soups, bujons, etc.). On the other hand, positive changes have been registered for commodity groups like 402 ( milk, yoghurts), 403 , 405 (butter and other butters, milk fat, 808 - apples, pears and other fresh fruits, 2103 (ingredients for souces, etc.).

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

In the table below, data on agro-food trade between EU 27 and Russian federation are presented:

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

<b>Commodity group</b>	<b>B 20006</b>	<b>D06/02</b>	<b>d06/04</b>
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

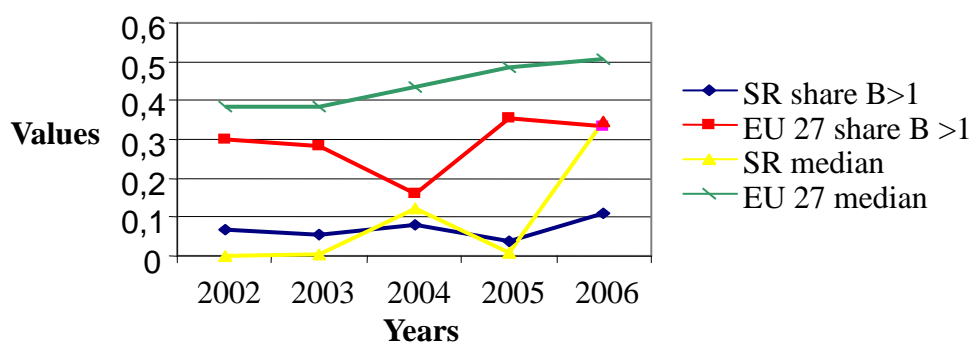
Source: own calculation, data from EUROSTAT and International Trade Center

In the post enlargement period, positive changes have been identified for commodity groups like 102 (live cattle), 103 (live swine), 105 (live chicken), 1207 (other oilseeds). On the other hand, negative changes have been identified for commodity groups like 204 (live sheep), 209 (Pork bacon, fat, frash 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 EU 27 is that no comparative advantages have been identified in relation to Russian Federation, regarding the agro-food trade. The median value of B indexes in both cases is lower than one. Regarding the share of commodity groups with B larger than one, the largest number of groups have been registered in 2006, for Slovakia, as well as for EU 27. For Slovakia, from the total number of analyzed items (204), only 22 had B indexes larger than one. In case of EU 27, out of 277 items only 98 had B indexes larger than one in 2005. These were years where the largest number of commodity groups with  $B > 1$  have been identified.

**Figure 3: Median and share of the commodity groups with the value B > 1: Slovak republic and EU 27 to Russian Federation**



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

As presented in the figure above, the median value of B indexes for EU 27 has been increasing since 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 suddenly it increases remarkable 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 show signs of stagnation in the number of groups with comparative advantages in the case of Slovakia.

The results of regression analysis of agro-trade between Slovakia and EU27 on one hand and Russian Federation on the other, are presented in the table below:

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

<b>Russian Federation</b>	<b>Beta</b>	<b>R2</b>	<b>B/R</b>	<b>N</b>
Slovak republic	0,025748	0,003182	0,456456	204
EU 27	0,450525	0,371094	0,739566	277

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

The value of  $\beta$  is between 0 and one for Slovakia and EU 27, meaning that in both cases agro-food commodity groups with comparative advantages have been declining, revealing declining comparative advantages in agro-trade with Russia. Since the analysis of the regressor is not sufficient to conclude, as  $\beta$  may be significant while the coefficient of determination ( $R^2$ ) may be low. So we look at the ratio between  $\beta$  and R, and as it shows values lower than 1 in both cases, the conclusion is that Slovakia and EU 27, in the post accession period are loosing comparative advantages in agro-food trade with Russian Federation.

### **The Analysis of export comparative advantages of Slovak and EU 27 agro-trade with Ukraine**

In the table below, the most remarkable changes of Balassa indexes are presented:

**Table 4: Development of the Balassa index for selected commodity groups:  
Slovak republic – Ukraine**

<b>Commodity group</b>	<b>B 2006</b>	<b>d06/02</b>	<b>d06/04</b>
105	1746,666129	1607,44477	1424,334593
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 EUROSTAT and International Trade Center

In the framework of agro-trade between Slovakia and Ukraine, positive changes have been identified in the period 2006/2004 comparing to the period 2006/2002 for commodity groups like 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, bujon, prepared soup homogeneous mix).

Based on the analysis of B indexes for agro-trade between Slovakia and Ukraine positive changes have been identified for commodity groups like 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 commodity groups like 203 (pork meat fresh, frozen), 704 (cabbage, cauliflower, etc.), 705 (lettuce, and other fresh or frozen

vegetables), 712 (dry vegetables, cut or powder), 1805 (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).

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

Commodity group	B 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 EUROSTAT and International Trade Center

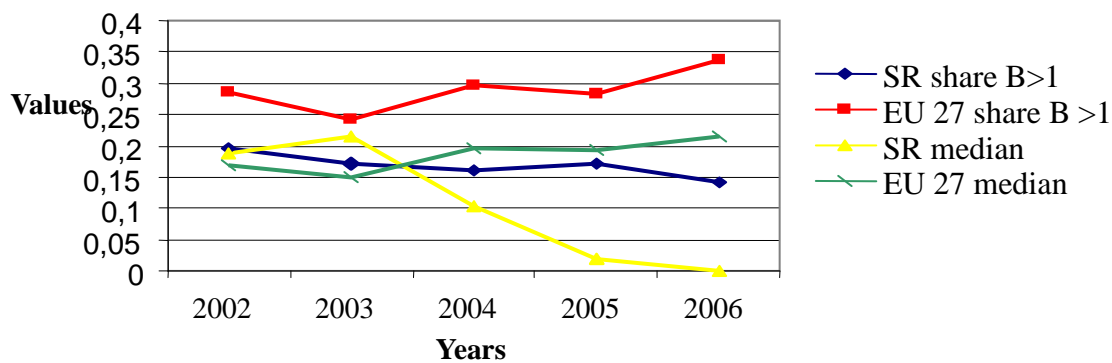
While comparing Balassa indexes between EU 27 and Ukraine, positive changes have been identified in the period 2006/2004 compared to period 2006/2002 for commodity groups 711 (temporary conserved vegetables not suitable for consumption), 1514 (rape oil, etc.). On the other hand negative changes have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

EU enlargement had positive effects on EU 27 exports to Ukraine for commodity groups 105 (live poultry), 804 (dates, figs, avocado, mango, fresh or dry), 1105 (flour,

cornflakes, potato granules, 1205 (rape seeds), 1517 (butter, animal fats and vegetable oils). On the other hand enlargement affected negatively the commodity groups 407 (poultry eggs), 510, 1204, 1516 (fats, vegetable oils, etc.), 2302 (other mills products).

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

**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 Center

The figure above demonstrates that the median value of B, for Slovakia shows falling tendencies while the same indicator for 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 EU

27.

In the table below the results of the regression analysis in the case of Ukraine are presented:

**Table 6: Stability of the B index between the years 2003 and 2006: SR, EU 27 with Ukraine**

<b>Ukraine</b>	<b>Beta</b>	<b>R2</b>	<b>B/R</b>	<b>N</b>
SR	1,499337	0,001939	34,04518	204
EU 27	0,066084	0,013946	0,559584	277

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

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

In the case of EU 27 the value of  $\beta$  is lower than one, meaning that the number of commodity groups with comparative advantages at the beginning of analyzed period, has been decreasing. The ratio of  $\beta/R$  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 below (where a summary of regression analysis is presented) we can characterized the agri-trade between Slovakia and EU27 with Russia as well as the agri-trade of EU 27 with Ukraine do RF as trade of decreasing specialization. The situation is

different only in the case of agri-trade between Slovakia and Ukraine.

**Table 7: Structural stability of trade specialisation**

Country	Indicator	Russia	Ukraine
	R2	0,003182	0,001939
SR	Beta	0,025748	1,499337
	B/R	0,456456	34,04518
	R	0,056409	0,04404
	R2	0,371094	0,013946
EU 27	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 Center

### **Conclusion:**

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

The agricultural exports are mainly concentrated on 3 main commodities representing 60% of 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 CIS, EU 27 and Asian countries.

EU27 is the main supplier of agri-food products for Ukraine, followed by CIS. EU exports to Ukraine mainly, food products, tobacco, meat and meat products, while CIS exports meat, fish



and milk products, alcohol and non-alcoholic beverages, sweet 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, imports too. It is interesting to notice that the highest exports value have been registered in 2006 but has been falling since then. In general, Slovak agri-food trade balance with Ukraine is positive.

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

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

Based on the results of the analysis of Balassa indexes, the largest number of commodity groups with comparative advantages regarding Slovakian 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 EU 27, for 98 groups out of 277 comparative advantages were found.

The median value of Balassa indexes for the agri-trade between EU 27 and Russia has been increasing since the enlargement wave in 2004. Slovakian 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 Balassa indexes one can conclude that the degree of specialization in the agri-trade between Slovakia and European Union in one hand, and Russia in the other has been decreasing. The number of commodity groups with a comparative advantage has been reducing since enlargement. It is interesting to notice that the competitiveness of Slovakian and EU 27 agri-food commodities in the Russian market has been falling since accession.

Similarly in the article we analyze the situation of agri-trade with Ukraine. Based on the results of the analysis of Balassa indexes, the largest number of commodity groups with comparative advantages regarding Slovakian 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 EU 27, for 93 groups out of 276 comparative advantages were found in 2006.

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

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

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