Changes in Agri-Food Trade of the New Member States since EU Accession – A Quantitative Approach

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Abstract

In 2004 and 2007 twelve New Member States (NMS) joined the European Union (EU), causing several changes in the field of agriculture. One of the major changes was the transformation of national agri-food trade. The aim of the paper is to analyse the effects of EU accession on NMS agri-food trade, especially considering revealed comparative advantages. Results suggest that the intensity of NMS agri-food trade has increased significantly after accession, though there was a serious deterioration in NMS agri-food trade balance in most cases. It has also become evident that NMS agri-food trade was highly concentrated by country and by product, though concentration has not changed significantly after EU accession. Moreover, our analyses highlight one of the most important characteristics of NMS agri-food trade structure - the focus on agri-food raw materials in export together with agri-food processed products in import. As to NMS agri-food trade specialisation, the diversity among member states becomes apparent. Almost all countries experienced a decrease in their comparative advantage after accession, though it still remained at an acceptable level in most cases. As for the stability of comparative advantage, results suggest a weakening trend, underpinned by the convergence of the pattern of revealed comparative advantage. By estimating the survival function to the sample, it is observable that the accession has radically changed the survival time of agri-food trade, meaning that revealed comparative advantage has not turned out to be persistent in the period analysed. From the policy perspective, there is a clear need for structural changes in NMS agriculture and agri-food sector in order to tackle the negative tendencies of national agri-food trade. The most important long-term goal should be the production and export of higher value-added processed products based on domestic raw materials.

Keywords: EU accession, agri-food trade, New Member States

JEL code: Q17, Q18

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Introduction

In 2004 and 2007 twelve New Member States (NMS) joined the European Union (EU), causing several changes in the field of agriculture. One of the major changes was the transformation of national agri-food trade, as indicated by several authors (Fertő 2008, Bojnec and Fertő 2008b, Jambor 2010). Bojnec and Fertő (2008b), for instance, have investigated the determinants of price and quality competition in agro-food trade between five Central and Eastern European Countries (CEEC) and the EU-15 in the pre-enlargement period. They found that the Czech Republic and Slovakia have made catching up in successful quality competition, but not in successful price competition. However, Hungary and Poland have also made catching up in successful quality competition and to a lesser extent in successful price competition. Only Slovenia has not made any significant catching up in successful quality competition. Fertő (2008) analysed evolving patterns of agri-food trade in eight CEE countries by using empirical procedures based around the classic Balassa index. He concluded that EU accession increased the intensity of trade in the region, though had a negative impact on agro-food relative trade advantage for all eight analyzed countries. He also found higher and more stable relative trade advantage for bulk primary raw agricultural commodities and less for consumer-ready foods, implying competitiveness shortcomings in food processing.

Bojnec and Fertő (2008a) analysed the integration of agricultural trade between South-East Europe and EU15 and found that in spite of the predominantly inter-industry nature of trade in this respect, the proportion of vertical intra-industry trade in total agricultural trade is increasing, generating a change in resource allocations between agricultural sectors. Moreover, the authors showed that agricultural trade of different quality and price products between the two regions is a consequence of trade liberalisation, economic growth and the transition in agricultural sectors.

Bojnec and Fertő (2008b) investigated the level, composition, and differences in the dynamics of revealed comparative advantage and trade specialization patterns of NMS in 1999-2006. They pointed out that trade increased with the EU enlargement and so did revealed comparative advantage in agro-food products, though there were catching-up difficulties in higher value-added processed products.

Jambor (2010) analysed structural changes in Hungarian agricultural trade after EU accession, especially considering intra-industry trade. His results suggest that EU accession raised the intensity of trade contacts but had a negative impact on trade balance. It was also proven that nominal values of both exports and imports increased after 2004, however, Hungarian agriculture is increasingly based on raw material export and processed food import. Moreover, it turned out that after accession, national agricultural export by country and product has shown a high but decreasing level of concentration, while in the case of agricultural import, concentration was increasingly high by country and consistently low by products.

Despite these studies and apparent importance of the topic, a relatively small number of research was dealing with the impacts of EU accession on NMS agri-food trade patterns. The aim of the paper, therefore, is to expand the scant literature of the field by providing a comprehensive analysis of the effects of EU accession on NMS agri-food trade. In order to reach this aim, the paper is structured as follows. First, a demonstration of the methods and data used is given followed by an analysis of structural changes in NMS agri-food trade, providing a background for analysis. The second part of the paper looks behind data by

analysing the specialisation and stability of NMS agri-food trade with EU15. The third part provides a policy-oriented discussion on the results, combining micro and macro level economic analyses. The last part concludes.

Methods and data used

The various methods elaborated around the theory of revealed comparative advantages provide the basis for analysis. The original index of revealed comparative advantage was first published by Balassa in 1965 who defined the following (Balassa, 1965):

$$B_{ij} = \left(\frac{X_{ij}}{X_{it}} \right) \Big/ \left(\frac{X_{nj}}{X_{nt}} \right), \quad (1)$$

where *x* means export, *i* indicates a given country, *j* is for a given product, *t* stands for a group of products and *n* for a group of countries. It follows that revealed comparative advantage or disadvantage index of exports to reference countries can be calculated by comparing a given country's export share from its total export - in correlation with the focus country's export share in their total export. If B>1, a given country has a comparative advantage compared to focus countries - or, in contrast, a revealed comparative disadvantage.

The Balassa-index is especially criticized because it is seen to neglect the different effects of agricultural policies and asymmetric values. Trade structure is distorted by different state interventions and trade limitations, while the asymmetric value of the B index reveals that it extends from one to infinity if a country enjoys comparative advantage from a product, but in case of comparative disadvantage, it varies between zero and one, which overestimates a sector's relative weight. Vollrath suggested three different specifications of revealed comparative advantages in order to eliminate the disadvantages of the Balassa-index, the detailed description of which can be found in Vollrath (1991).

A further problem with the Balassa-index is its questionable ability to measure comparative advantage. Hillman (1980) developed a necessary and sufficient condition for the correspondence between the Balassa-index and pre-trade relative prices for a specific sector under homothetic preferences, the so-called Hillman condition. By using the notations of the first equation, it can be expressed as:

$$1 - Xij / Xnj > Xij / Xit \, (1 - Xit / Xnt) \quad (2)$$

This condition (2) is to be met for the Balassa-index to ensure that if a country's export increases, so does the Balassa-index. In order to empirically test the condition, Marchese and de Simone (1989) converted the second equation into:

$$HI = (1 - Xij / Xjn) / Xij / Xti \, (1 - Xti / Xtn) \quad (3)$$

If HI>1, the B-index is suitable for measuring comparative advantage. The first empirical test of the Hillman condition was executed by Marchese and de Simone (1989) by analysing exports of 118 developing countries at different level of aggregation. They found that the Hillman condition does not hold for about 9.5 percent of the value of exports in their sample, while Hinloopen and Van Marrewijk (2001) proved that the Hillman condition does

not hold for about half percent of the number of observations, which corresponds to about seven percent of the value of exports. According to the latest empirical tests, based on around 18 million observations coming from 183 countries and 28 years, violations of the Hillman condition are small as a share of the number of observations but often represent a disproportionally large value of trade (Hinloopen and van Marrewijk, 2008). It was also proven by the authors that violations do not occur randomly across sectors or countries but they occur foremost in sectors producing primary products or that are natural-resource intensive. On the whole, Hinloopen and van Marrewijk (2008) recommend the test as a standard diagnostic tool when analysing revealed comparative advantages.

Besides using the Hillman condition, the article uses the Revealed Symmetric Comparative Advantage (RSCA) index, developed by Dalum et al. (1998), thereby tackling the problems of the B index cited above. The index is a transformed B index as follows:

$$RSCA = (B-1)/(B+1) \quad (4)$$

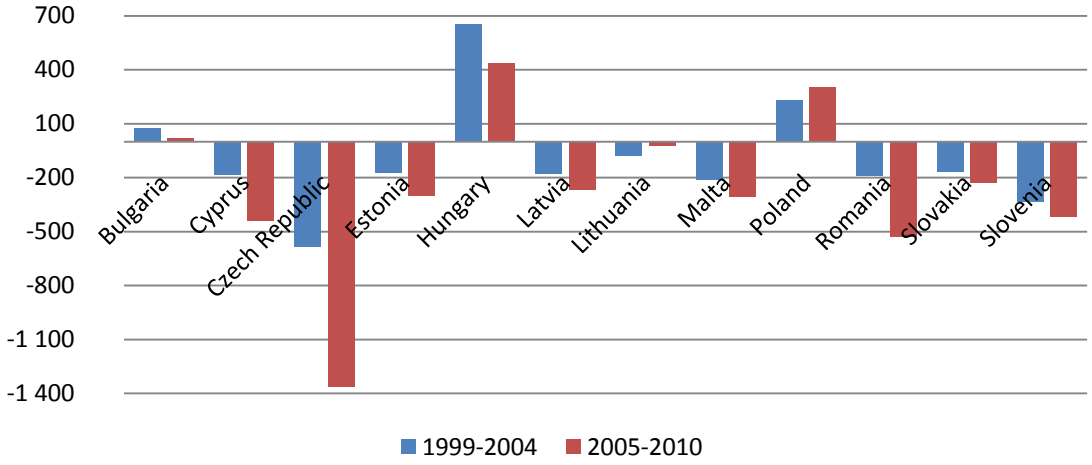
The RSCA takes values between -1 and 1, with values between 0 and 1 indicating a comparative export advantage and values between −1 and 0 a comparative export disadvantage. Since the RSCA distribution is symmetric around zero, a potential bias in the regression coefficients is avoided (Dalum et al, 1998).

In order to calculate the various indices mentioned above, the paper has used the Eurostat trade database by the HS6 system. Agri-food trade is defined as trade in food and beverages (HS 1-24), resulting in 848 products in 24 products groups pertaining to agriculture. The paper works with trade data for 1999-2010 and divides this period into two sub-periods (1999-2004, 2005-2010), providing a basis for analysing effects of EU accession clearly. In this context, the EU is defined as the member states of the EU15. Furthermore, the article only concentrates on the B index (and its transformation, the RSCA index) as it excludes imports, which are more likely to be influenced by policy interventions. The possible phasing out of export subsidies is a further reason to choose a B-based index.

Changes in the agri-food trade of NMS

Significant changes have appeared in the NMS agri-food trade with EU15 after EU accession (Figure 1). On the one hand, three countries (Bulgaria, Hungary and Poland) had a positive trade balance in the period analysed and only Poland could increase it after EU accession. On the other hand, all other countries had a negative trade balance with increasing deficit (except Lithuania). The Czech Republic almost tripled, while Cyprus and Romania nearly doubled their trade deficit of 1999-2004 to 2005-2010. One might conclude that the EU accession resulted in an increased trade deficit in agri-food and beverages products on NMS level.

Figure 1: The agri-food trade balance of NMS with EU15 (million euro)



Source: Own composition based on EUROSTAT (2011)

By analysing the structure of NMS agri-food export by destination, more trends become available (Table 1). First, the share of EU15 in total agri-food trade has increased in most countries, except Cyprus, while in Hungary, Latvia and Romania it stayed on a similar level. Consequently, the common market helped these countries to sell more products to the EU15; Cyprus (61%) and Poland (59%) had the highest share of her export going to EU15 markets, while Malta had the lowest (21%). Second, the majority of NMS has increased their agri-food export in their own region, implying that EU accession has increased the intensity of agri-food trade inside the CEEC. Slovenia, for instance, has more than tripled her agri-food export to the NMS after accession, while Bulgaria has made it almost two times higher. Third country destinations still play an important role in NMS agri-food export, as Table 1 suggests. A continuously decreasing share of NMS agri-food export has gone to third countries in most cases after accession, though almost every third export transaction in the region is still headed towards third country destinations. As an exception, Slovakia remained the only country whose main agri-food export market was the NMS, while for Malta the most important markets are outside of the EU.

Table 1: NMS agri-food export by destination, 1999-2010 (%)

	EU15		NMS		Rest of the world	
	1999-2004	2005-2010	1999-2004	2005-2010	1999-2004	2005-2010
Bulgaria	39	43	11	21	50	36
Cyprus	63	61	6	4	31	36
Czech Republic	39	45	43	45	17	9
Estonia	35	37	33	31	31	32
Hungary	50	50	21	31	29	19
Latvia	24	24	35	38	41	38
Lithuania	36	37	26	27	38	37
Malta	16	21	1	1	83	78
Poland	51	59	17	21	32	20
Romania	52	52	14	19	34	28
Slovenia	24	52	4	14	72	34
Slovakia	24	27	64	68	11	5

Source: Own composition based on EUROSTAT (2011)

Regarding agri-food import by destination, it is apparent that the share of EU15 in total agri-food import has increased considerably after accession in most cases (Table 2). Malta had the highest share of EU15 agri-food products on shelves (82%) after accession, while Slovakia had the lowest (32%). The NMS as a whole had a limited role as a source of agri-food import, except for Latvia and Slovakia where a considerable share (>45%) of the total agri-food import came from the region. Note that trade among the NMS has increased everywhere (except Slovenia), while the importance of the third countries has declined in almost all cases (except Slovenia).

Table 2: NMS agri-food import by destination, 1999-2010 (%)

	EU15		NMS		Rest of the world	
	1999-2004	2005-2010	1999-2004	2005-2010	1999-2004	2005-2010
Bulgaria	39	49	12	23	49	28
Cyprus	61	70	2	6	37	23
Czech Republic	53	64	23	29	23	8
Estonia	57	59	24	32	19	9
Hungary	51	61	18	30	32	9
Latvia	44	41	40	47	16	12
Lithuania	44	44	25	38	31	18
Malta	77	82	2	4	21	13
Poland	54	69	10	11	36	20
Romania	34	43	22	30	44	26
Slovenia	56	55	17	14	27	31
Slovakia	36	32	48	64	16	4

Source: Own composition based on EUROSTAT (2011)

On the whole, one can conclude that EU accession has enhanced the intensity of trade relations with the EU15 and that the share of the EU15 has increased in total NMS agri-food

trade in most cases. However, EU accession has resulted in an increased trade deficit in agri-food products on NMS level.

A more disaggregated list of the main trading partners of NMS reveals further changes in agri-food trade structure. In 1999 the main export market of NMS agri-food trade was Germany, where the half of the exported products was sold (Table 3). Besides Germany, relevant export markets were Italy, the Netherlands, Austria and France, and these TOP5 countries represented 87% of the total export going to the EU15 from NMS. Consequently, the concentration of NMS agri-food export with EU15 by country was really high before accession. Table 3 also shows a significantly changed share after accession, although the share of the TOP5 countries was still very high (84%). The share of Germany fell significantly (from 50% to 38%), though Italy increased its importance (from 14% to 19%). By 2010, the United Kingdom has overtaken Austria among the TOP5 export destinations.

Table 3: NMS TOP5 agri-food trade with EU15 by country, 1999-2010 (%)*

Export				**Import**			
1999		**2010**		**1999**		**2010**	
Germany	50	Germany	38	Germany	33	Germany	40
Italy	14	Italy	19	Netherlands	21	Netherlands	23
Netherlands	9	Netherlands	9	Italy	13	Italy	9
Austria	7	France	9	Spain	8	Austria	7
France	7	United Kingdom	8	France	7	Spain	6
TOP 5 total	**87**	**TOP 5 total**	**84**	**TOP 5 total**	**82**	**TOP 5 total**	**85**

* Based on shares in total NMS agri-food trade with EU15, in descending order

Source: Own composition based on EUROSTAT (2011)

NMS agri-food import by destination also shows high concentration. In 1999 the main source of NMS agri-food import was Germany, from where the third of the imported products came (Table 3). Besides Germany, relevant markets regarding import were the Netherlands, Italy, Spain and France, and these TOP5 countries represented 82% of the total import coming from EU15 to NMS. Consequently, the concentration of NMS agri-food import with EU15 by country was almost as high as in case of export before accession. However, agri-food import shares have somewhat changed after accession, although the share of the TOP5 countries was still very high (85%). The share of Germany and the Netherlands has risen, while all the other TOP5 countries have lost market shares after accession. By 2010, Austria has overtaken France among the TOP5 import destinations.

Analysing NMS agri-food trade by product group also shows signs of high concentration. The main product groups of NMS agri-food export in 1999 were meat and edible meat offal, edible vegetables, dairy products, vegetable preparations and oil seeds (Table 4). Their overall share in total NMS agri-food export to EU15 was 75%, which has remained after accession. Meat and edible meat offal has maintained its first place, but the share of this product group has decreased. However, the share of the other TOP5 agri-food export products remained the same (14-16%). Note that after EU accession, NMS agri-food export to the EU15 remained very concentrated, though some of the most important products changed: cereals and tobacco appeared among the TOP5 in 2010.

Table 4: NMS TOP5 agri-food trade with EU15 by product group, 1999-2010 (%)*

Export				Import			
1999		**2010**		**1999**		**2010**	
Meat and edible meat offal	24	Meat and edible meat offal	17	Edible fruits	17	Meat and edible meat offal	23
Edible vegetables	15	Cereals	16	Miscellaneous edible	15	Edible fruits	14
Dairy products	13	Tobacco	15	Residues	15	Residues	12
Vegetable preparations	12	Oil seeds	14	Animal or vegetable fats	12	Miscellaneous edible	10
Oil seeds	11	Dairy products	14	Meat and edible meat offal	11	Dairy products	8
TOP5 total	**75**	**TOP5 total**	**76**	**TOP5 total**	**69**	**TOP5 total**	**66**

* Top 5 products in HS2 classification according to their shares in total NMS agri-food trade with EU15, in descending order

** The name of product groups is abbreviated. See HS2 full names and codes in appendix

Source: Own composition based on EUROSTAT (2011)

NMS agri-food import by product group also shows signs of high concentration. The main product groups of NMS agri-food import in 1999 were edible fruits, miscellaneous edible products, residues, animal or vegetable fats and meat and edible meat offal (Table 4). Their overall share in total NMS agri-food import from EU15 was 69%, which has somewhat decreased after accession. Meat and edible meat offal has strengthened its position, while the share of all other TOP5 product groups has decreased. It should be seen that after EU accession, NMS agri-food import from EU15 remained very concentrated, though some of the most important products changed: dairy products, for instance, appeared among the TOP5 in 2010.

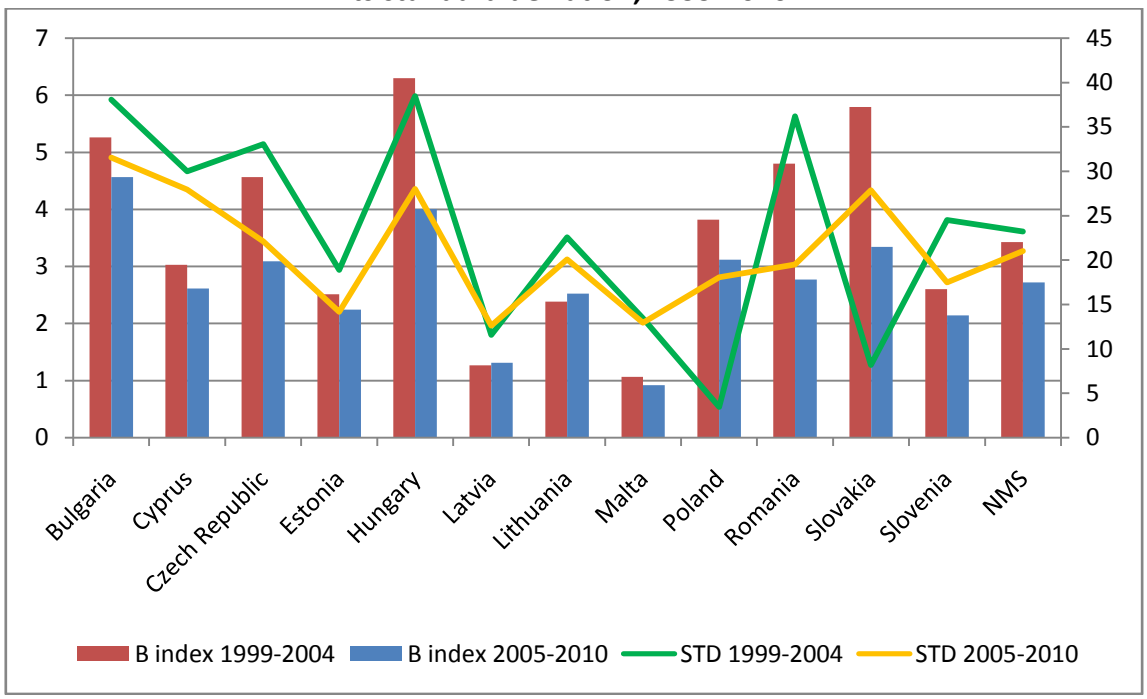
The analysis of NMS agri-food trade structure has resulted in a number of conclusions. First, it is clear that the intensity of NMS agri-food trade has increased significantly after accession, though agri-food import growth has outweighed the growth of agri-food export, resulting in a serious deterioration of NMS agri-food trade balance in most cases. Second, results show that the share of EU15 in NMS agri-food trade has increased in the majority of cases, underpinning the importance of analysing NMS-EU15 trade relations in the rest of this paper. Third, it has also become evident that NMS agri-food trade was highly concentrated by country and by product, implying that the same products were traded with the same countries in most cases. Regarding trade by product group, one might also observe intra-industry trade patterns – trade inside the same product categories.

However, the concentration of the NMS agri-food trade with EU15 has not changed significantly after EU accession as the share of the TOP5 product groups in total agri-food export stayed almost at the same level. Last but not least, it can also be seen that one of the most important characteristics of NMS agri-food trade structure is the focus on agri-food raw materials in export together with agri-food processed products in import.

Specialisation of NMS agri-food trade

Following Marchese and de Simone (1989), our data set is found to be consistent with the Hillman condition. With calculation of the B indices the diversity of NMS agri-food trade specialisation becomes apparent (Figure 2)[1]. First, all countries except Latvia and Lithuania experienced a decrease in their B index after accession, implying deterioration in their comparative advantage. However, all countries except Malta still had a revealed comparative advantage (B>1) in 1999-2010. Hungary had the highest B index (6.30) before, while Malta had the lowest B index (0.92) after accession. The average B index of the NMS has decreased slightly (from 3.42 in 1999-2004 to 2.72 in 2005-2010). Standard deviations of the B indices over the whole sample are relatively low, suggesting moderate variation from year to year, and they present a clear decreasing trend after accession.

Figure 2: Revealed comparative advantage of NMS agri-food trade in EU15 by B index and its standard deviation, 1999-2010*



* Data for Poland and Slovakia are just available from 2004
* STD stands for standard deviation
Source: Own calculations based on EUROSTAT (2011)

Similar conclusions can be drawn if analysing the distribution of the B index over time. Table 5 presents the mean, the standard deviation and the maximum value of the B index as well as the distribution of B values by year. It is clear from Table 5 that revealed comparative advantage for NMS has weakened after accession, indicated by a steadily decreasing mean of the B index by time. The standard deviation was relatively low over the period, while the maximum values of the B index were also decreasing. The share of the B<1 values indicate that the vast majority of products had a revealed comparative disadvantage in the period

[1] The B indices are calculated at the six digit level and then aggregated to the two digit level.

analysed. However, this trend seems to slightly change as the values with B>1 somehow increased after accession.

Table 5: The distribution of the B index in NMS, 1999-2010

B index EU15	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mean	3.27	2.94	2.63	2.61	2.79	3.45	3.32	3.05	2.62	2.48	2.61	2.24
Standard Deviation	31.72	28.48	23.84	25.47	27.19	27.18	29.66	23.41	21.33	21.02	22.79	18.27
Maximum	949.78	958.25	761.94	899.76	959.36	969.79	895.99	702.68	856.13	746.33	822.37	709.35
Per cent												
<1	0.92	0.92	0.93	0.92	0.92	0.89	0.89	0.88	0.88	0.88	0.88	0.88
<2	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
<4	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03
>4	0.05	0.05	0.05	0.05	0.05	0.07	0.06	0.07	0.06	0.06	0.06	0.06

Source: Own calculations based on EUROSTAT (2011)

If matching these results with those on the export concentration and B index of the TOP5 product groups of NMS agri-food trade (Table 6), it becomes apparent that all countries' leading products in agri-food export had a revealed comparative advantage in 1999 as well as in 2010, though it has been continuously decreasing after accession in most cases. The biggest drop in the B index from 1999 to 2010 can be observed in Latvia (32%), while the highest increase can be found in Slovenia (33%) with great diversity among countries. By matching these results with the export concentration of the TOP5 product groups in all countries concerned, it becomes apparent that export concentration also decreased after accession in most cases, implying that export specialisation and B indices were moving together, as expected. This argument can be underpinned by the results of the Spearman rank correlation between the two variables, showing perfect correlation and total dependency at all levels of significance for all countries concerned. This suggests that NMS countries were specialised in exporting products with a comparative advantage and vice versa.

Table 6: Export concentration and B index of NMS TOP5 agri-food product groups in EU15, 1999-2010*

	Export concentration		B index		Change (2010/1999)	
	1999	2010	1999	2010	Export concentration	B index
Bulgaria	0.76	0.67	8.82	10.54	0.88	1.20
Cyprus	0.90	0.86	9.27	9.29	0.95	1.00
Czech Republic	0.58	0.52	16.94	9.16	0.89	0.54
Estonia	0.84	0.60	14.30	5.62	0.72	0.39
Hungary	0.62	0.64	23.44	11.93	1.02	0.51
Latvia	0.77	0.82	9.46	3.05	1.06	0.32
Lithuania	0.78	0.62	7.36	8.13	0.79	1.10
Malta	0.93	0.97	3.26	2.88	1.03	0.88
Poland	0.52	0.49	8.97	6.84	0.93	0.76
Romania	0.74	0.77	24.59	9.10	1.04	0.37
Slovakia	0.63	0.66	26.76	10.79	1.04	0.40
Slovenia	0.60	0.71	5.56	7.39	1.18	1.33

* Data for Poland and Slovakia are just available from 2004

* Based on the products in HS2 classification obtaining the highest shares in export and the highest B indices

Source: Own calculations based on EUROSTAT (2011)

Stability of revealed comparative advantage

Results above clearly show the specialisation of NMS agri-food trade with EU15, though fails to demonstrate the stability of revealed comparative advantage. In other words, the question comes how persistent the structure of NMS agri-food trade is. This question can be analysed in many ways, though econometric logic suggests to use RSCA indices instead of B indices for calculations as RSCA distribution is symmetric around zero.

In analysing the stability of the RSCA index, a regression was run on the dependent variable, RSCA index at time t2 (for sector i in country j), which is tested against the independent variable – the RSCA index in year t1 (5).

$$RSCA_{ij}^{t2} = \alpha_i + \beta_i RSCA_{ij}^{t1} + \varepsilon_{ij} \quad (5)$$

where α and β are standard linear regression parameters and ε is a residual term. If β = 1, then this suggests an unchanged pattern of RSCA between periods t1 and t2, meaning there is no change in the overall degree of specialization in NMS agri-food trade. On the one hand, if β > 1, the existing specialization of NMS is strengthened, meaning that a low level of specialization in the initial period leads to less specialization in the future, which is called β divergence (Bojnec and Fertő, 2008b). On the other hand, if 0 < β < 1, commodity groups with low initial B indices grow over time, which is called β convergence (Bojnec and Fertő, 2008b). However, if β < 0, a change in the sign of the index is shown.

However, as Dalum et al. (1998) point out, the β > 1 is not a necessary condition for growth in the overall specialization pattern. They argue that sufficient conditions for

specialization or despecialization need further analyses. If R is the correlation coefficient of the regression, then the pattern of a given distribution is unchanged when β = R. If β >R, then the degree of specialization has grown (leading to divergence). If β < R, then the degree of specialization has fallen (meaning convergence).

By using our dataset to estimate various lags for Equation 5, the resulting β values show that trade patterns have significantly changed after accession (Table 7).

Table 7: Stability of the RSCA index between 1999 and 2010

Lags	α	β	p-value	R^2	R	β/R	N
1	-0.0415	0.8763	0.0000	0.7801	0.8832	0.9922	32173
2	-0.0645	0.8108	0.0000	0.6796	0.8244	0.9835	27646
3	-0.0823	0.7551	0.0000	0.5997	0.7744	0.9751	23448
4	-0.0963	0.7113	0.0000	0.5432	0.7370	0.9651	19790
5	-0.1174	0.6656	0.0000	0.4851	0.6965	0.9556	16436
6	-0.1385	0.6178	0.0000	0.4263	0.6529	0.9462	13168
7	-0.1535	0.5863	0.0000	0.3918	0.6259	0.9367	9877
8	-0.1713	0.5485	0.0000	0.3459	0.5881	0.9326	7757
9	-0.1918	0.5244	0.0000	0.3209	0.5665	0.9257	5734
10	-0.1930	0.5077	0.0000	0.3016	0.5492	0.9245	3887
11	-0.1983	0.5023	0.0000	0.2980	0.5459	0.9201	1932

Source: Own calculations based on EUROSTAT (2011)

By running the model with a single lag, the value of β was relatively high but increasing the number of time lags measurably decreases β values. The β values indicate that the pattern of revealed comparative advantage has converged, or in other words, low B values increased over time while high values decreased, resulting in despecialisation of NMS agri-food trade after accession. These results are also underpinned by the β/R values, as suggested by Dalum et al. (1998). On the whole, the hypothesis of B index divergence can be rejected.

As to the duration of comparative advantage before and after accession, the survival function S(t) can be estimated by using the non-parametric Kaplan–Meier product limit estimator, which pertains to the product level distribution analysis of the RSCA index. Following Bojnec and Fertő (2008b), the derivation is as follows. It is assumed that a sample contains *n* independent observations denoted (*ti; ci*), where *i = 1, 2 , . . . , n* and *ti* is the survival time, while *ci* is the censoring indicator variable C (taking on a value of 1 if failure occurred, and 0 otherwise) of observation i. Moreover, it is assumed that there are *m < n* recorded times of failure. Then, we denote the rank-ordered survival times as *t(1) < t(2) < … < t(m)*. Let *nj* indicate the number of subjects at risk of failing at *t(j)* and let *dj* denote the number of observed failures. The Kaplan–Meier estimator of the survival function is then (with the convention that *ˆS(t) = 1 if t < t(1)*):

$$\hat{S}(t) = \prod_{t(i)<t} \frac{n_j - d_j}{n_j} \tag{6}$$

By estimating the survival function to the sample, it is observable that the accession has radically changed the survival time of agri-food trade, meaning that revealed comparative advantage has not turned out to be persistent in the period analysed (Table 8). Irrespective of the specific product group, it is apparent that survival chances of 92-93% from 1999 fell back to 1-7% to 2010, indicating that the accession has created a fierce competition in agri-food trade where only the most viable could remain. The greatest decline among TOP5 product groups can be seen in the case of meat, while the smallest was in the case of cereals.

It is worth checking the equality of the survival functions across product groups by using two non-parametric tests (Wilcoxon test and log-rank test). Results show that the hypothesis of equality of the survival function across product groups can be rejected at 1% level of significance, meaning that no similarities exist across product groups in the duration of comparative advantage (Table 8).

Table 8
Kaplan-Meier survival Survival Rates for RSCA index for equality of survival function in NMS agri-food trade with EU15, 1999–2010*

Survivor rates	Total	Meat and edible meat offal	Cereals	Tobacco	Oil seeds	Dairy products
1999	0.9234	0.9226	0.9275	0.9236	0.9271	0.9265
2000	0.8458	0.8446	0.8524	0.8451	0.8527	0.8510
2001	0.7676	0.7659	0.7778	0.7653	0.7768	0.7754
2002	0.6890	0.6856	0.7072	0.6834	0.7001	0.6992
2003	0.6099	0.6057	0.6326	0.6019	0.6238	0.6248
2004	0.5327	0.5304	0.5624	0.5271	0.5477	0.5558
2005	0.4541	0.4546	0.5000	0.4449	0.4680	0.4842
2006	0.3740	0.3767	0.4343	0.3634	0.3863	0.4119
2007	0.2916	0.2963	0.3608	0.2835	0.3007	0.3388
2008	0.2060	0.2115	0.2806	0.2012	0.2137	0.2541
2009	0.1150	0.1193	0.1937	0.1127	0.1202	0.1573
2010	0.0139	0.0166	0.0726	0.0146	0.0176	0.0344
Log-rank test	0					
Wilcoxon test	0					

* Average for all product groups together with TOP5 product groups of NMS in 2010
** The name of product groups is abbreviated. See HS2 full names and codes in appendix
Source: Own calculations based on EUROSTAT (2011)

Discussion and policy recommendations

By analysing the changes in NMS agri-food trade with EU15, some trends become observable. First, it is observable that NMS agri-food trade had a negative trade balance after accession in the majority of the countries concerned. Second, it is also clear that comparative advantage of NMS agri-food trade has significantly weakened after accession

together with a decrease in their survival chances. What is the background to these changes?

Changes originate in external and internal causes. The most important external cause is the EU accession and the following changes in trade policy and the opening of national agri-food markets to EU competition. In practice, the share of high value added and price competitive foreign processed products has increased in NMS markets, which could not be counterweighted by the expanding regional export based on easily substitutable mass agri-food products (Csaki and Jambor, 2010). The reason here is that processed products created in EU15 are much more price competitive in the regional markets market than NMS raw materials appearing in EU15 markets.

Another important external factor was the tough adjustment to new market conditions. EU membership has made the NMS part of a large, rather competitive market. On the one hand, this market offers tremendous opportunities for their agricultural sectors; on the other hand, they are faced with significantly increased competition in their domestic markets. This situation is due to the rapid emergence of vertically coordinated food chains including hypermarkets, supermarkets and multinational agro-processing companies with regional procurement systems, thus creating new and much more competitive conditions both for producers and consumers; the market share of foreign-origin products has increased significantly. Due to very strong price competition, consumers are generally the beneficiaries of these changes. At the same time producers are not always able to adjust, or to cope with business practices employed by the large chains. The concentrated and Europe-wide procurement systems of the major chains create high requirements for suppliers and impose strong price pressures as well (Csaki and Jambor, 2010).

The food crisis experienced worldwide from 2007-2008 was also not in favour of the development of NMS agri-food trade. High prices of agricultural raw materials, increasing energy prices and obligatory standards after accession have all made the manufacture of processed products expensive, which could not be shifted to consumers due to fierce price competition. Therefore, the food industry of the majority of NMS has found herself under a so called ‘double pressure’, from which she still has not recuperated.

The subsidy policy of competitors is also important to be mentioned as an external cause. The traditionally high agricultural subsidies of the EU15 have artificially increased the competitiveness of agri-food products imported by NMS after accession, generating unequal competitive positions in EU15 markets (this argument is even more valid if taking into account that only a marginal amount of direct payments have been received by new member states right after accession – except for Slovenia and Malta opting for the SPS system). Moreover, adjustment to subsidies of the EU, the acquaintance of the system or the creation of institutional infrastructure were all time consuming, which altogether delayed the cut-back of national competitive disadvantages (Csaki and Jambor, 2010).

However, it would be a mistake to derive all tendencies from external causes as several internal factors have also contributed to the unfavourable trend of NMS agri-food trade. First, the competitiveness of NMS agri-food export has been decreasing for many years, caused by several inner problems of the majority of NMS agriculture (dual production structure, lack of capital, lack of land consolidation, etc.). It should be emphasized that the structure of production after the accession has moved towards a more extensive direction, namely towards crop production, indicating a significant shift towards a less extensive agriculture. The structure became more extensive even in those countries in which crop production already dominated before accession. Moreover, the majority of NMS utilized

agricultural area is still arable land, producing low value added bulk cereals, while animal sectors have been in a recession for decades in many countries (Csaki and Jambor, 2009).

Another internal reason behind unfavourable changes in agri-food trade balance can be associated with problems of the regional agri-food processing industries like internal market loss or declining performance indicators. The regional industry is still suffering from the 'double pressure' indicated above in most cases, though to a different extent. On the one hand, food-processing industry in foreign hands are working in a globalised world of specialisation, can force their transportation, logistics, labour or other costs into the minimum, while dividing their investment costs, thereby better using the advantages residing in concentration, specialisation and regionalisation. On the other hand, small and medium enterprises (SME) employing less people are suffering more from the problems mentioned above, their debts are increasing, investments are missing and their viability is weakening.

On the whole, there is a clear need for structural changes in NMS agriculture and agri-food sector in order to tackle the negative tendencies of national agri-food trade. The most important long term goal should be the production and export of high value added processed products based on national raw materials (instead of exporting bulk produce and importing processed products). Taking into consideration that the agri-processing industry is still the major buyer of agricultural products, the only way for the future is that the two are working together. Having that said, the production structure of NMS agriculture needs to be changed and sectors producing higher value (animal, horticulture) should be encouraged. It is also clear that competitiveness of NMS agriculture and the whole agri-food industry should be enhanced (for instance, by targeted investments, by increasing technological efficiency, by rationalising farm sizes, by reducing taxes, etc.).

Conclusions

The paper analysed the effects of EU accession on NMS agri-food trade, especially considering revealed comparative advantages, and has reached a number of conclusions. First, by analysing structural changes in Hungarian agri-food trade, it turned out that the intensity of NMS agri-food trade has increased significantly after accession, though agri-food import growth has outweighed the growth of agri-food export, resulting in a serious deterioration of NMS agri-food trade balance in most cases. Second, results show that the share of EU15 in NMS agri-food trade has increased in the majority of cases. Third, it has also become evident that NMS agri-food trade was highly concentrated by country and by product, implying that the same products were traded with the same countries in most cases. Regarding trade by product group, one might also observe intra-industry trade patterns. However, the concentration of the NMS agri-food trade with EU15 has not changed significantly after EU accession as the share of the TOP5 product groups in total agri-food export stayed almost at the same level. Fourth, it can also be seen that one of the most important characteristics of NMS agri-food trade structure is the focus on agri-food raw materials in export together with agri-food processed products in import.

Regarding the specialisation of NMS agri-food trade, the diversity among member states becomes apparent. All countries except Latvia and Lithuania experienced a decrease in their comparative advantage after accession, though it still remained at an acceptable level in most cases. However, results indicate that the vast majority of products had a revealed

comparative disadvantage in the period analysed but this trend seems to slightly improve. As to the stability of comparative advantage, results suggest a weakening trend, underpinned by the convergence of the pattern of revealed comparative advantage. By estimating the survival function to the sample, it is observable that the accession has radically changed the survival time of agri-food trade, meaning that revealed comparative advantage has not turned out to be persistent in the period analysed. From the policy perspective, there is a clear need for structural changes in NMS agriculture and agri-food sector in order to tackle the negative tendencies of national agri-food trade. The most important long-term goal should be the production and export of higher value-added processed products based on domestic raw materials.

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Appendix

PRODUCT GROUPS BY HS2 CLASSIFICATION	CODE
Live animals	01
Meat and edible meat offal	02
Fish and crustaceans, molluscs and other aquatic invertebrates	03
Dairy produce, birds' eggs, natural honey, edible products of animal origin not elsewhere specified or included	04
Products of animal origin, not elsewhere specified or included	05
Live trees and other plants, bulbs, roots and the like, cut flowers and ornamental foliage	06
Edible vegetables and certain roots and tubers	07
Edible fruit and nuts, peel of citrus or melons	08
Coffee, tea, mat and spices	09
Cereals	10
Products of the milling industry, malt, starches, inulin, wheat gluten	11
Oil seeds and oleaginous fruits, miscellaneous grains, seeds and fruit, industrial or medicinal plants, straw and fodder	12
Lac, gums, resins and other vegetable saps and extracts	13
Vegetable plaiting materials, vegetable products not elsewhere specified or included	14
Animal or vegetable fats and oils and their cleavage products, prepared edible fats, animal or vegetable waxes	15
Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	16
Sugar and sugar confectionery	17
Cocoa and cocoa preparations	18
PRODUCTS Preparations of cereals, flour, starch or milk, pastrycooks' products	19
Preparations of vegetables, fruit, nuts or other parts of plants	20
Miscellaneous edible preparations	21
Beverages, spirits and vinegar	22
Residues and waste from food industries, prepared animal fodder	23
Tobacco and manufactured tobacco substitues	24