Changes in Hungarian Agri-Food Trade Since EU accession

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Abstract

In 2004, Hungary joined the European Union (EU) along with nine other countries. One of the major changes resulting from this was the transformation of these countries' agri-food trade. The paper analyses the effects of EU accession on Hungarian primary and processed agri-food trade, using revealed symmetric comparative advantage based on the most recent available data. Results suggest that accession has enhanced the value of trade relations with the EU. Hungary's agri-food imports have increased faster than agri-food exports, but the trade balance remains at around €1 billion, similar to its pre-accession level. Both exports and imports are highly and increasingly concentrated, by country and by product group, with exports based mainly on bulk raw materials and imports based principally on processed products. Revealed comparative advantages have weakened after accession. Indeed, the majority of products reveal a comparative *dis*advantage over the entire period, and this majority was larger in the post-accession period. Regarding stability, accession has radically changed the survival time of agri-food trade, in that revealed comparative advantage is shown not to be persistent. From the policy perspective, there is a clear need for radical structural changes in Hungarian agriculture and the agri-food sector. 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, revealed comparative advantages

JEL code: Q17, Q18

1. Introduction

A major change resulting from the accession of 12 new member states (NMS) to the European Union (EU) in 2004 has been the transformation in their agri-food trade (see, for example, Fertő, 2008; Bojnec and Fertő, 2008b; Jambor, 2010). In general, trade has increased as a result of enlargement, though there have been 'catching-up' difficulties for some of the NMS in terms of price and quality competition, more so in higher value-added processed products (Bojnec and Fertő, 2008b). EU accession has tended to increase the value of trade in the NMS, but has had a negative impact on agri-food trade comparative advantages, particularly for consumer-ready foods, implying competitiveness shortcomings in food processing (Fertő, 2008). Furthermore, despite the predominantly *inter*-industry nature of trade between the NMS and the EU15, the proportion of vertical *intra*-industry trade in total agricultural trade has increased, generating a change in resource allocation between some sectors (Bojnec and Fertő, 2008a).

In Hungary, in the immediate pre-accession period, revealed comparative advantages were evident for both animal and arable products (Fertő and Hubbard, 2003). More recently, structural changes in Hungarian agri-food trade, especially with respect to intra-industry trade, suggest that EU accession has raised the value of trade, with a marked increase in exports and imports since 2004, but with Hungarian exports based increasingly on bulk raw materials and imports on processed foods (Jambor, 2010). Moreover, following accession, agri-food exports have shown a high but decreasing level of concentration, by destination and product type, while in the case of agri-food imports, concentration has been high and increasing by source, but consistently low by product (Jambor, *op. cit.*).

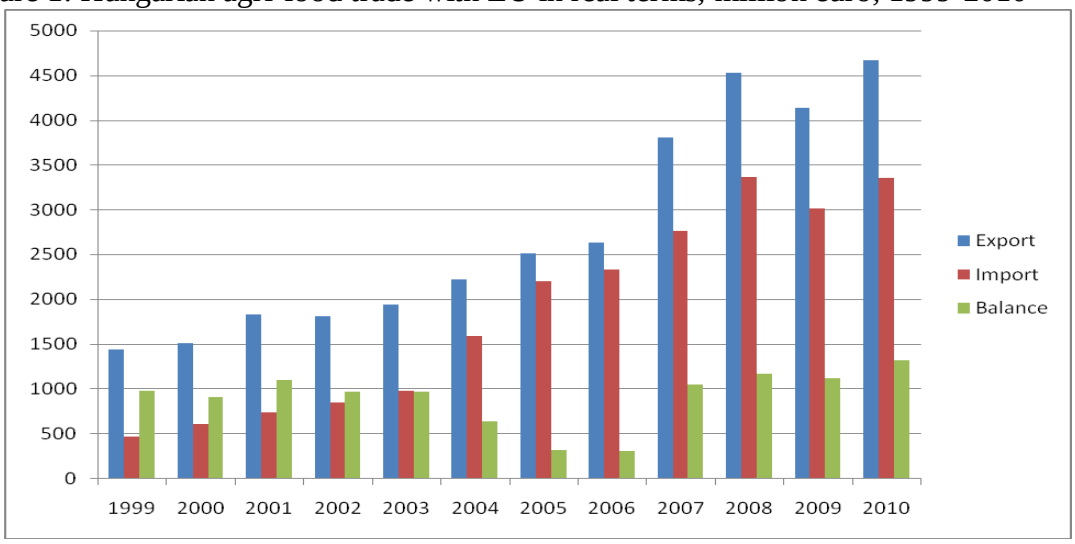
This paper adds to the literature by providing a clearer analysis of the effects of EU accession on Hungarian primary and processed agri-food trade by employing data that includes six years of post-accession trade. The paper is structured as follows. Section 2

presents an overview of the structural changes in Hungarian primary and processed agri-food trade, providing a background for the subsequent analysis. Section 3 outlines the methods and data. Section 4 deals with the specialisation and stability of this trade within the enlarged EU. Section 5 provides a policy-oriented discussion based on the results, combining external and internal factors. The final section concludes.

2. Changes in Hungarian agri-food trade

Significant changes have occurred in Hungarian agri-food trade with the EU over the period. Agri-food exports to the EU more than tripled, in real terms, from 1999 to 2010, while agri-food imports increased more than sevenfold, resulting in a decrease in the export/import ratio (Figure 1). However, although Hungary's agri-food trade balance with the EU worsened significantly between 2004 and 2006, it has since risen to exceed pre-accession levels.

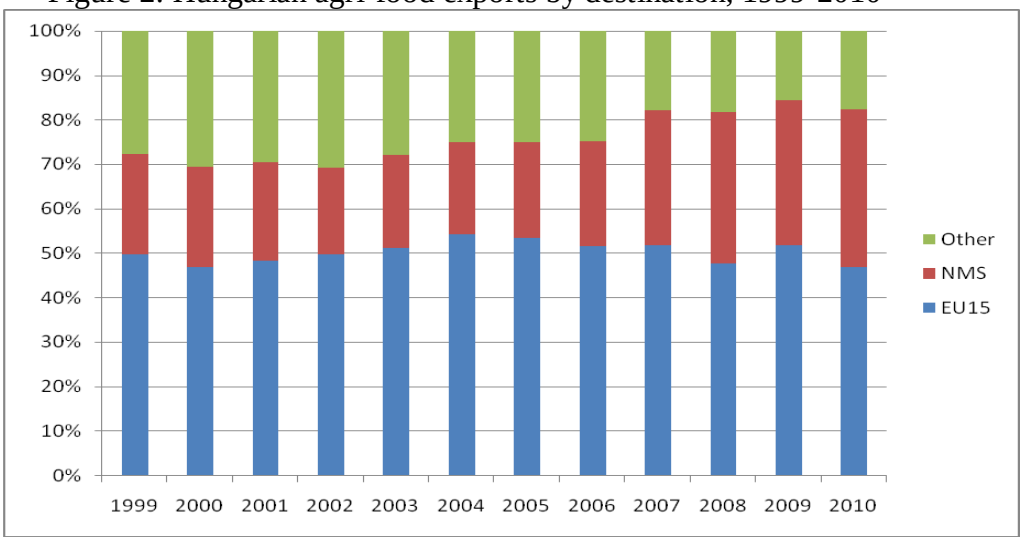
Figure 1: Hungarian agri-food trade with EU in real terms, million euro, 1999-2010



Source: Own composition based on EUROSTAT (2011)

EU accession has enhanced the value of agri-food trade with the EU countries (Fertő, 2008), but this has not been uniform by destination of exports or source of imports. The share of Hungary's agri-food exports destined for the EU15 remained at around 50% over the period analysed, but the share to the NMS increased measurably after accession to reach 36% in 2010 (compared to around 20% prior to accession). This growth was mainly at the expense of exports to third countries (Figure 2).

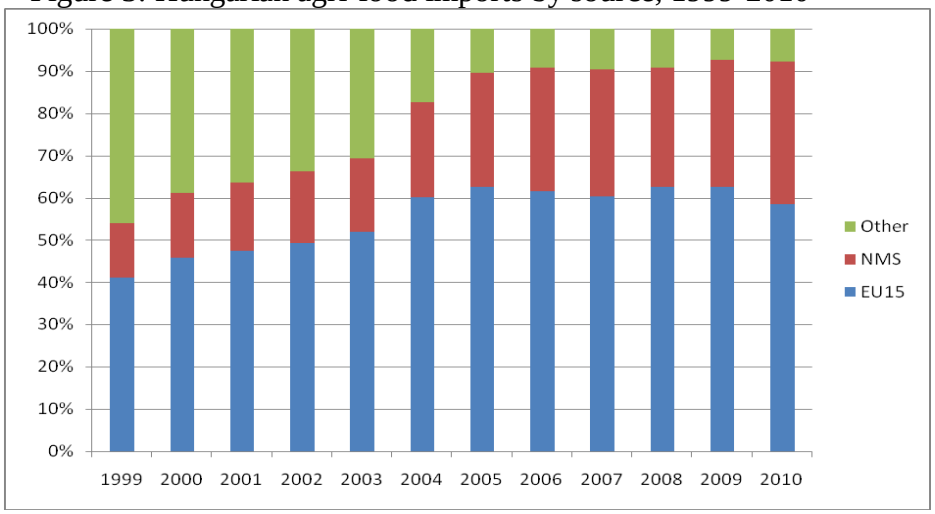
Figure 2: Hungarian agri-food exports by destination, 1999-2010



Source: Own composition based on EUROSTAT (2011).

Changes can also be observed in Hungary's agri-food imports by destination. The share of imports from the EU15 increased to around 60% after accession, compared to around 50% in 2003 and 40% in 1999. The share of agri-food imports from the NMS increased to over 30% from under 20% prior to accession. As a consequence, imports from outside the EU decreased significantly from 46% in 1999 to 8% in 2010.

Figure 3: Hungarian agri-food imports by source, 1999-2010



Source: Own composition based on EUROSTAT (2011).

A closer examination of the main trading partners of Hungary reveals further changes in the structure of agri-food trade. The main export markets were Germany, Romania, Italy, Austria and Slovakia, with an overall average share of 57% before, and 62% after, accession (Table 1). In terms of imports, the main partners were Germany, Poland, the Netherlands, Austria and Slovakia, with an overall share of 57% before, and 67% after, accession. It can be concluded that the concentration of Hungary's agri-food exports and imports to and from the EU, by country, is both high and increasing.

Table 1: Top 5 agri-food trading partners of Hungary, percentage, 1999-2010*

Exports			Imports		
Country	1999-2004	2005-2010	Country	1999-2004	2005-2010
Germany	26.1	19.0	Germany	18.6	24.0
Romania	8.5	13.1	Poland	10.6	13.4
Italy	9.3	12.6	Netherlands	14.7	13.4
Austria	10.3	10.1	Austria	7.1	8.3
Slovakia	2.9	7.2	Slovakia	5.7	7.8
Total	57.0	62.0	Total	56.7	67.0

* Based on shares in total Hungarian agri-food trade with the EU, in descending order of 2005-2010 averages.
Source: Own composition based on EUROSTAT (2011).

Similarly, the product structure of Hungarian agri-food trade also shows signs of high and increasing concentration. The main exports over the period were cereals (mainly maize and wheat), oil seeds (mainly sunflower seeds), meat and edible meat offal (predominantly frozen meat of swine and ducks), residues from the food industries (principally oilcake) and preparations of vegetables and fruits (mostly apple juice, prepared cherries and peas). Their combined share in total Hungarian agri-food exports to the EU was 56% before, and 60% after, accession, indicating a high and increasing concentration (Table 2). There was a near doubling in the importance of cereal exports after accession, together with a notable decrease in importance of meat exports. On the import side, the main product groups were residues from the food industries (mainly oilcake and dog and cat food), miscellaneous edible preparations (predominantly coffee extracts, sauces and ice cream), beverages, spirits and vinegar (mostly water and spirits), dairy products (principally cheese) and preparations of cereals (mainly bread, pastry and cakes). Their overall share was 42% before, and 45% after, accession, showing once again a high and increasing concentration (Table 2). No major changes among the shares of the top 5 imports occurred after accession. Note, however, that product group 23 appears in the top 5 for both exports and imports, indicating intra-industry trade. It is also worth noting that Hungarian agri-food exports consist mainly of raw materials, while agri-food imports are mostly processed products. This is discussed further below.

Table 2: Top 5 agri-food product groups of Hungary, percentage, 1999-2010*

Exports			Imports		
Product	1999-2004	2005-2010	Product	1999-2004	2005-2010
Cereals (10)	13.1	23.5	Residues and waste from the food industries** (23)	12.9	12.6
Oil seeds** (12)	9.0	10.0	Miscellaneous edible preparations (21)	10.2	9.8
Meat and edible meat offal (02)	15.2	9.3	Beverages, spirits and vinegar (22)	5.9	7.6
Residues and waste from the food industries** (23)	7.7	8.7	Dairy products** (04)	5.9	7.9
Preparations of vegetables and fruits** (20)	11.0	8.0	Preparations of cereals** (19)	7.4	7.3
Total	56.0	60.0	Total	42.4	45.1

* Top 5 products in HS2 classification according to their shares in total Hungarian agri-food trade with EU, in descending order based on 2005-2010 averages.
** See full names in HS2 Trade Classification, HS2 product codes are in brackets.
Source: Own composition based on EUROSTAT (2011).

In summary, it can be concluded that accession has enhanced the value of trade relations with the EU and that the share of the EU15 and the NMS in total Hungarian agri-food trade has increased. Hungary's agri-food imports have increased faster than agri-food exports, but the trade balance remains at around €1 billion, similar to its pre-accession level. Both exports and imports are highly and increasingly concentrated, by country and by product group, with exports based mainly on bulk raw materials and imports based principally on processed products.

To examine changes in the Hungarian agri-food trade structure with EU, correlation coefficients were calculated with 1999 as a base year (Table 3). It is apparent that neither agri-food exports nor imports were stable over the period analysed, with the correlation coefficient decreasing considerably over time. After accession, the coefficient remained below 0.73 in all cases, reaching a minimum in 2007 (Table 3). In general, the export and import structure changed gradually and in parallel, indicating that the product mix of Hungarian agri-food exports and imports has been changing continuously.

Table 3: Correlation coefficients of Hungarian agri-food trade structure with EU, 2000-2010 (base year=1999)

Year	2000	2001	2002	2003	2004	2005
Exports	0.94	0.90	0.84	0.77	0.75	0.74
Imports	0.90	0.85	0.87	0.84	0.75	0.66
Year	2006	2007	2008	2009	2010	
Exports	0.73	0.63	0.64	0.66	0.64	
Imports	0.64	0.61	0.61	0.60	0.61	

Source: Own composition based on EUROSTAT (2011).

3. Methods and data

The original index of revealed comparative advantage (B) was published by Balassa (1965):

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

where X is export, i is a given country, j is a given product, t is a group of products and n is a group of countries. If B>1, country j has a revealed comparative advantage compared to the focus countries, n. The Balassa index is criticized because it neglects the effects of government policies and exhibits asymmetric values. Trade structure is distorted by different state interventions and trade restrictions, while the asymmetry means the index extends from 1 to infinity if a country enjoys a comparative advantage in a product, but varies between only 0 and 1 if it reveals a comparative disadvantage. Accordingly, alternative specifications have been suggested (see, for example, Vollrath, 1991). Some of these alternative measures include imports as well as exports, but since imports are more likely to be influenced by policy interventions, and given that export subsidies are being phased out, we choose to retain the B index, but transformed into the Revealed Symmetric Comparative Advantage (RSCA) to overcome its inherent asymmetry (see Dalum et al., 1998):

$$RSCA = (B-1)/(B+1) \qquad (2)$$

RSCA is bounded by -1 and 1, with RSCA>0 indicating comparative advantage and RSCA<0 indicating comparative disadvantage.

Hillman (1980) developed a necessary and sufficient condition for the correspondence between the B index and pre-trade relative prices for a specific sector under homothetic preferences, the so-called Hillman condition:

$$1 - Xij / Xnj > Xij / Xit \, (1 - Xit / Xnt) \, . \qquad (3)$$

This ensures that if a country's exports increase, so does the B index. In order to empirically test this condition, Marchese and de Simone (1989) converted (3) into:

$$HI = (1 - Xij / Xjn) / Xij / Xti \, (1 - Xti / Xtn) \, . \qquad (4)$$

If HI>1, the B index is suitable for measuring comparative advantage. Empirical testing has shown that violations of the Hillman condition are, in general, small as a share of the number

of observations, but often represent a disproportionally large share of the value of trade (Marchese and de Simone, 1989; Hinloopen and Van Marrewijk, 2001). Hinloopen and van Marrewijk (2008) recommend the test as a standard diagnostic tool when analysing revealed comparative advantage.

In this paper we use the Eurostat trade database, HS6 system. Agri-food trade is defined as trade in food and beverages (HS 1-24), resulting in 848 products in 24 product groups. The paper uses trade data for 1999-2010 divided into two sub-periods (1999-2004 and 2005-2010), thus providing a 'before and after' basis for analysing effects of EU accession.[1] In this context, the EU is defined as comprising 27 member states.

4. Specialisation of Hungarian agri-food trade

Following Marchese and de Simone (*op. cit.*), our data set is found to be consistent with the Hillman condition. With calculation of the RSCA indices various patterns of Hungarian agri-food trade specialisation become apparent (Table 4)[2]. First, only five of 24 main product groups had a revealed comparative advantage in both periods (RSCA>0). Moreover, the RSCA index of 16 of these product groups declined after accession, implying deterioration in comparative advantage. The highest RSCA index (0.62) is for vegetable planting materials in the pre-accession period, whilst that for cereals is relatively high in both periods (0.36 and 0.35). Comparing these results with those in Table 2, all top five export product groups had an RSCA>0 before accession, but only three after accession. On the import aside, the top five product groups all reveal an RSCA<0 after 2004. Standard deviations of the RSCA indices of individual product groups over the whole sample are quite high, suggesting variation from year to year, but they do not present a clear pattern before and after accession as suggested in some previous research (Fertő, 2008).

Table 4: RSCA of Hungarian agri-food trade with EU by main product group, 1999-2010

	Mean		Standard Deviation	
	1999-2004	2005-2010	1999-2004	2005-2010
01: Live animals	**0.20**	**0.12**	0.67	0.64
02: Meat and edible meat offal	**0.28**	**0.16**	0.70	0.69
03: Fish, crustaceans, molluscs	**0.13**	-0.30	0.75	0.86
04: Dairy produce	-0.55	-0.39	0.59	0.69
05: Products of animal origin	**0.17**	-0.18	0.67	0.65
06: Live trees and other plants	-0.22	-0.66	0.60	0.35
07: Edible vegetables	-0.04	-0.14	0.72	0.67
08: Edible fruits and nuts	-0.15	-0.31	0.79	0.68
09: Coffee, tea, mate and spices	-0.27	-0.38	0.58	0.65
10: Cereals	**0.36**	**0.35**	0.74	0.62
11: Products of the milling industry	-0.57	-0.44	0.50	0.53
12: Oil seeds	**0.06**	-0.13	0.68	0.73
13: Lac and gums	-0.97	-0.94	0.03	0.11
14: Vegetable planting materials	**0.62**	**0.19**	0.50	0.99
15: Animal or vegetable fats and oils	-0.24	-0.40	0.69	0.69

[1] To ensure that data for the post-accession sub-period comprised full years, 2004 is included in the pre-accession sub-period, since accession was from 1st May 2004.

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

16: Preparations of meat	-0.06	-0.28	0.73	0.74
17: Sugars and sugar confectionery	-0.37	**0.06**	0.60	0.64
18: Cocoa and cocoa preparations	-0.45	-0.41	0.55	0.64
19: Preparations of cereals	-0.53	-0.53	0.36	0.49
20: Preparations of vegetables and fruits	**0.02**	-0.10	0.61	0.65
21: Miscellaneous edible preparations	-0.24	-0.18	0.57	0.67
22: Beverages, spirits and vinegar	-0.58	-0.54	0.50	0.62
23: Residues and waste from the food industries	**0.22**	**0.27**	0.66	0.58
24: Tobacco	-0.51	-0.54	0.31	0.39

Source: Own calculations based on EUROSTAT (2011)

Note: Those indices in **bold** reveal a comparative advantage.

Similar conclusions can be drawn if analysing the changing distribution of the RSCA index over time. Table 5 presents summary statistics – mean and standard deviation – for the RSCA indices by year, as well as the proportion of indices above and below zero. It is clear that revealed comparative advantage has weakened after accession, with the mean RSCA falling from close to zero in the pre-accession years to -0.36 in 2010. The share of RSCA<0 indicates that a majority of products had a revealed comparative *dis*advantage over the entire period, and that this majority was larger in the post-accession period.

Table 5: The distribution of the RSCA index by year

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mean	-0.07	-0.07	-0.07	-0.11	-0.08	-0.25	-0.17	-0.15	-0.16	-0.18	-0.19	-0.36
Standard Deviation	0.70	0.71	0.70	0.70	0.70	0.70	0.70	0.69	0.69	0.70	0.70	0.68
RSCA<0	55.56	56.27	55.72	56.62	54.73	64.97	60.16	60.22	59.04	58.27	59.48	68.38
RSCA>0	44.44	43.73	44.28	43.38	45.27	35.03	39.84	39.78	40.96	41.73	40.52	31.62

Source: Own calculations based on EUROSTAT (2011).

5. Stability of revealed comparative advantage

How persistent is the structure of Hungarian agri-food trade? In analysing the stability of revealed comparative advantage, the RSCA index in year t2 (for sector i) was regressed on the RSCA index in year t1 (after Dalum *et al.*, 1998).

$$RSCA_i^{t2} = \alpha_i + \beta_i RSCA_i^{t1} + \varepsilon_i \quad (5)$$

where α and β are standard linear regression parameters and ε is a residual term. If β=1, this suggests an unchanged pattern of RSCA between the two periods, meaning there is no change in the overall degree of specialization in Hungarian agri-food trade. If β>1, the existing specialization of Hungary is strengthened (termed β specialisation). If 0<β<1, specialisation is weakened (β de-specialisation). If β<0, a change in the sign of the index occurs. However, Dalum *et al.* (1998) point out that specialisation needs further analysis. If R is the correlation coefficient of the regression, then the pattern of a given distribution is unchanged when β = R.[3] If β>R, then the degree of specialization has grown. If β<R, then the degree of specialization has fallen.

[3] This is because it can be shown that $|\beta| / |R| = \sigma^{t2} / \sigma^{t1}$.

Our panel dataset was used to estimate equation 5 with various lags. In all cases $0<\beta<1$, meaning that low (negative) RSCA values increased over time, while high (positive) values decreased, resulting in *de*specialisation of Hungarian agri-food trade. This is supported by the β/R values of <1.

Table 6
Stability of the RSCA index between 1999 and 2010

Lag	α	β	p-value	R^2	R	β/R	N
1	-0.0100	0.9277	0.0000	0.8673	0.9313	0.9961	3458
2	-0.0212	0.8841	0.0000	0.7956	0.8920	0.9912	3052
3	-0.0289	0.8461	0.0000	0.7367	0.8583	0.9858	2699
4	-0.0388	0.8172	0.0000	0.6921	0.8319	0.9823	2373
5	-0.0485	0.7817	0.0000	0.6381	0.7988	0.9786	2079
6	-0.0536	0.7394	0.0000	0.5773	0.7598	0.9731	1785
7	-0.0618	0.7240	0.0000	0.5508	0.7422	0.9755	1414
8	-0.0628	0.7084	0.0000	0.5316	0.7291	0.9716	1127
9	-0.0731	0.6783	0.0000	0.4886	0.6990	0.9704	834
10	-0.0847	0.6806	0.0000	0.4887	0.6991	0.9736	588
11	-0.0939	0.6264	0.0000	0.4056	0.6369	0.9836	328

Note: the p values relate to the testing of both $\beta=0$ and $\beta=1$.
Source: Own calculations based on EUROSTAT (2011).

As to the duration of comparative advantage before and after accession, a survival function S(t) can be estimated by the using the non-parametric Kaplan–Meier product limit estimator, which pertains to the product level distribution analysis of the RSCA index. Following Bojnec and Ferto (2008b), 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 $t(1) < t(2) < \ldots < t(m)$. 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 $\hat{S}(t) = 1$ *if* $t < t(1)$):

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

On estimating this function using the sample data, it is clear that the survival times of revealed comparative advantages in agri-food trade are not persistent over the period analysed (Table 7). Irrespective of the specific product group, survival chances of 95-97% at the start of the period fell to 10-37% by 2010, suggesting that accession has created fierce competition in agri-food trade. The greatest decline among product groups can be seen in the case of oilseeds (12), while the smallest was for cereals (10). The equality of the survival functions across product groups can be checked using two non-parametric tests (Wilcoxon test and log-rank test). Results show that the hypothesis of equality can be rejected at the 1% level of significance, meaning that similarities across product groups in the duration of comparative advantage are absent (Table 7).

Table 7
Kaplan-Meier survival rates for RSCA index and tests for equality of survival functions in Hungarian agri-food trade with EU, 1999–2010

Years	Survivor function	Cereals (10)	Oil seeds (12)	Meat and edible meat offal (02)	Residues and waste (23)	Prep. of vegetables and fruits (20)
1999	0.9567	0.9580	0.9652	0.9709	0.9552	0.9694
2000	0.9133	0.9286	0.9211	0.9404	0.9154	0.9395
2001	0.8701	0.9130	0.8860	0.9135	0.8815	0.9034
2002	0.8212	0.8711	0.8532	0.8791	0.8365	0.8652
2003	0.7725	0.8441	0.8094	0.8394	0.8074	0.8222
2004	0.6938	0.8049	0.7252	0.7837	0.7643	0.7592
2005	0.6303	0.7608	0.6738	0.7264	0.6926	0.6975
2006	0.5634	0.7117	0.6053	0.6554	0.6542	0.6467
2007	0.4939	0.6681	0.5170	0.5885	0.6399	0.5710
2008	0.4146	0.6330	0.4249	0.5202	0.6222	0.4738
2009	0.3167	0.5392	0.3116	0.4162	0.5761	0.3515
2010	0.1001	0.3707	0.1161	0.1942	0.3521	0.1547
Log-rank test: p value	0.0000					
Wilcoxon test: p value	0.0000					

Source: Own calculations based on EUROSTAT (2011).

6. Discussion and policy recommendations

By analysing the changes in Hungarian agri-food trade with the EU over the period 1999-2010, some trends become evident. First, this trade is based mainly on raw material exports and processed food imports. Second, it is clear that revealed comparative advantages in Hungarian agri-food exports have significantly weakened since accession and their survival rate has also decreased. What is the background to these changes?

Changes originate in external and internal causes. The most important external cause is EU accession and subsequent changes in trade policy and the opening of national agri-food markets to EU competition. In practice, this has meant a marked increase in Hungary's imports of high value-added and price-competitive processed products, while exports continue to be the more easily substitutable bulk agri-food products. Processed products from the EU15 are much more price competitive in the national market than are Hungarian raw materials in EU15 markets.

Another important external factor has been the tough adjustment to new market conditions. EU membership has made Hungary, and indeed all the NMS, part of a very large and very competitive market. Whilst this offers tremendous opportunities for their agricultural sectors, the NMS are faced with significantly increased competition in their domestic markets. This situation reflects 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 (Csaki and Jambor, 2010). Due to the 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 the business practices employed by the large chains. The concentrated and Europe-wide procurement systems of the major chains create stringent requirements for suppliers and impose strong price pressures (Csaki and Jambor, 2010).

The hike in international commodity prices in 2007-2008 did not favour the development of Hungary's agri-food trade. High prices of agricultural raw materials and energy, in addition to the obligatory EU standards after accession, have all made the manufacture of processed products more expensive. These additional costs are difficult to pass on to consumers due to the fierce price competition. As a result, Hungary's food industry has found itself under extreme pressure, from which it still has not recovered.

The subsidy policy of competitors is also important as an external cause. The traditionally high agricultural subsidies of the EU15 have artificially increased the competitiveness of agri-food products imported by Hungary after accession, generating unequal competitive market positions. (This argument is strengthened if account is taken of the small proportion of direct payments that have been received by the NMS immediately after accession). Moreover, adjustment to EU subsidy levels, coupled with gaining acquaintance of the new system and the creation of the necessary institutional infrastructure, have been time consuming, which has delayed the response of Hungary to address its competitive disadvantages.

However, it would be a mistake to focus exclusively on external causes, as several internal factors have also contributed to the changes in Hungarian agri-food trade since EU accession. First, the competitiveness of Hungarian agri-food exports has been decreasing for many years, caused by problems of Hungarian agriculture (poor organisation, dual production structure, lack of capital, inefficient logistics, etc.). It should be emphasised that structural change in Hungarian agriculture has not followed the same path as that of developed countries, where animal and horticultural products predominate in line with changing consumer demands for high quality and biologically clean products. The majority of Hungary's agricultural area is still arable land, producing low value-added bulk cereals, while animal sectors have been in recession for decades.

Another internal reason behind the changes in Hungary's agri-food trade is associated with problems of the domestic agri-food processing industry, such as loss of market share and declining performance indicators. The majority of the food-processing industry is still in foreign hands, where large multinationals with ongoing developments and investments hold the highest market share. These companies, working in a globalised world of specialisation, can force to a minimum their transportation, logistics, labour and other costs, thereby making better use of the advantages residing in concentration, specialisation and regionalisation. At the same time, small and medium enterprises are suffering from a number of problems; their debts are increasing, investments are, at best, minimal and their viability is weakening.

Overall, there is a clear need for radical structural changes in Hungarian agriculture and the agri-food sector. The most important long-term goal should be the production and export of higher value-added processed products based on domestic raw materials, rather than the current situation of exporting bulk produce and importing processed products. Considering that the agri-processing industry is still the major buyer of agricultural products, the way forward is for the two to work together. Within Hungarian agriculture, sectors producing higher value products (livestock, horticulture) should be encouraged. It is also clear that competitiveness of national agriculture and the whole agri-food industry needs to be enhanced (for instance, by targeted investments, increasing technological efficiency, rationalising farm sizes, reducing taxes, etc.). In order to achieve these goals Hungary needs a long term agri-food strategy.

7. Conclusions

This paper has analysed the effects of EU accession on Hungarian primary and processed agri-food trade, using indices of revealed symmetric comparative advantage based on the most recent available data. Accession has enhanced the value of trade relations with the EU and the share of the EU15 and the NMS in total Hungarian agri-food trade has increased. Hungary's agri-food imports have increased faster than agri-food exports, but the trade balance remains at around €1 billion, similar to its pre-accession level. Both exports and imports are highly and increasingly concentrated, by country and by product group, with exports based mainly on bulk raw materials and imports based principally on processed products.

Revealed comparative advantages have weakened after accession. Indeed, the majority of products had a revealed comparative *dis*advantage over the entire period, and this majority was larger in the post-accession period. Only five of 24 main product groups had a revealed comparative advantage in both periods, while the RSCA index of 16 of these product groups declined after accession. Standard deviations of the RSCA indices of individual product groups over the whole sample are quite high, suggesting variation from year to year, but they do not present a clear pattern before and after accession as suggested in some previous research.

Regarding stability, it is clear that accession has radically changed the survival time of agri-food trade, in that revealed comparative advantage is shown not to be persistent over the period analysed. From the policy perspective, there is a clear need for radical structural changes in Hungarian agriculture and the agri-food sector. 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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