Changing Product Structure and Comparative Advantage: The Case of Hungarian Agri-food Trade[1]

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Abstract

EU accession has changed the agri-food trade of New Member States, including Hungary. The article focuses on analysing the changing structure and comparative advantage of Hungarian agri-food trade by product group and degree of processing. It aims to provide a clearer analysis of the effects of EU accession on Hungarian primary and processed agri-food trade by employing the latest data. Results confirm that revealed comparative advantages have weakened after accession and that the vast majority of products had a revealed comparative disadvantage after 2004. It is clear that accession has radically changed the survival time of agri-food trade, reasons for which are also identified.

Keywords: *comparative advantages, agri-food trade, EU accession*

JEL Classification: Q17

Introduction

The formation of stronger economic ties between European countries due to the creation and expansion of the EU has contributed to changes in international trade. Over the past two decades Central and Eastern European countries have reoriented their trade from within former bloc states to EU member countries and comparative advantages with the EU have also changed (Jambor, 2013).

Despite the apparent importance of these changes, however, most studies have focused on industrial products, with agri-food sectors usually neglected in empirical works. Therefore, the aim of the paper is to analyse the changing

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product structure and comparative advantage of Hungarian agri-food trade at the product group level. It focuses on changes in each and every product group, but neglects country level analysis of destinations and sources. Such an approach, at least to our knowledge, is currently missing from the literature.

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 the latest data available. The paper is structured as follows. Section 2 presents an overview of the literature, followed by a demonstration of the methodology and the data used. Section 4 analyses the structural changes in Hungarian primary and processed agri-food trade, providing a background for the subsequent analysis. Section 5 deals with the specialisation and stability of agri-food trade within the enlarged EU, while Section 6 provides a policy-oriented discussion based on the results. The final section concludes.

Literature Review

Scientific literature on the impacts of EU accession on New Member States' (NMS) agri-food trade is limited, while competitiveness analyses by revealed comparative advantage are scarce with only 10 – 15 articles dealing with the issue.

Qineti, Rajcaniova and Matejkova (2009) analysed the competitiveness and comparative advantage of Slovak and EU agri-food trade with Russia and Ukraine and found that comparative advantage had been lost for a number of product groups over time, though results for individual product groups varied significantly. Fertő (2008) analysed the evolution of agri-food trade patterns in Central European Countries and found trade specialisation to be mixed. For particular product groups, greater variation was observed, with generally stable (unstable) patterns of variation for product groups with comparative disadvantage (advantage).

Jambor (2013) analysed the comparative advantages and specialisation of the Visegrad Countries agri-food trade and showed that comparative advantages decreased after accession in all countries, suggesting a weakening stability of competitive positions. Bojnec and Fertő (2009) searched for agro-food trade competitiveness of Central European and Balkan countries and showed that bulk primary raw agricultural commodities had higher and more stable relative trade advantages compared to consumer-ready foods, implying competitiveness shortcomings in food processing and in international food marketing. Bojnec and Fertő (2012) investigated the impact of EU enlargement on agro-food export performance of New Member States over 1999 – 2007 and found longer duration for exporting higher value-added specialized consumer-ready food and more competitive niche agro-food products.

In general, NMS agri-food trade has increased significantly after accession, though there was a serious deterioration in the trade balance in most cases. It is also evident that the NMS agri-food trade is highly concentrated by country and by product, though the concentration has not changed significantly since accession. Moreover, latest analyses highlight one of the most important characteristics of the NMS agri-food trade structure – the focus on agri-food raw materials in exports, together with agri-food processed products in imports (Torok and Jambor, 2013). Bojnec and Fertő (2008) had reached similar results, but added that 'catching-up' difficulties had existed for some of the NMS in terms of price and quality competition, especially in higher value-added processed products.

Methodology and Data

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

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

where

X – export,
i – a given country,
j – a given product,
t – a group of products,
n – a group of countries.

It follows that a revealed comparative advantage (or disadvantage) index of exports can be calculated by comparing a given country's export share of its total exports with the export share in total exports of a reference group of countries. If $B > 1$, a given country has a comparative advantage compared to the reference countries – or, in contrast, a revealed comparative disadvantage if $B < 1$.

The Balassa-index (B-index) is criticized because it neglects the different effects of agricultural policies and exhibits 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 a comparative advantage, but in the 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 advantage 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 B-index and pre-trade relative prices for a specific sector under homothetic preferences, the so-called Hillman condition. By using the notations of the equation 1, it can be expressed as:

$$1-\frac{Xij}{Xnj}>\frac{\mathrm{Xij}}{\mathrm{Xit}}\left(1-\frac{Xit}{Xnt}\right) \tag{2}$$

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

$$HI=\left(1-\frac{Xij}{Xnj}\right)/\frac{Xij}{Xti}/\left(1-\frac{Xit}{Xnt}\right) \tag{3}$$

If HI > 1, the B-index is suitable for measuring comparative advantage. The first empirical test of the Hillman condition was by Marchese and de Simone (1989) in analysing exports of 118 developing countries at different level of aggregation. They found that the Hillman condition does not hold for about 9.5% of the value of exports in their sample, while Hinloopen and van Marrewijk (2001) showed that the Hillman condition does not hold for about 0.5% of the number of observations, which corresponds to about 7% of the value of exports. 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 shown by the authors that violations do not occur randomly across sectors or countries, but 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, Laursen and Villumsen (1998), thereby tackling the asymmetry problems of the B-index cited above. The index is a transformed B-index as follows:

$$RSCA=(B-1)/(B+1) \tag{4}$$

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 is avoided (Dalum, Laursen and Villumsen, 1998).

Besides calculating revealed comparative advantages, the literature suggests that their stability and duration should be measured as well. Following Bojnec and Fertő (2008), 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 Fertő (2008), 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 $t < t(1)$):

$$\hat{S}(t) = \prod_{t(i)<t} \frac{n_j - d_j}{n_j} \tag{5}$$

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. However, the product structure of Hungarian agri-food trade with the EU-27 can also be analysed by degree of processing, which reveals other important characteristics. To this end, individual products are classified into six groups according to their level of processing, in line with the Broad Economic Categories (BEC) defined by the UN: food and beverages (F&B), primary, mainly for industry processing (111); F&B, primary, mainly for household consumption (112); F&B, processed, mainly for industry use (121); and F&B, processed, mainly for household consumption (122).

The paper employs trade data for 1999 – 2012 and, in this context, the EU is defined as the member states of the EU-27. Furthermore, it 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 phasing out of export subsidies is a further reason to choose a B-based index.

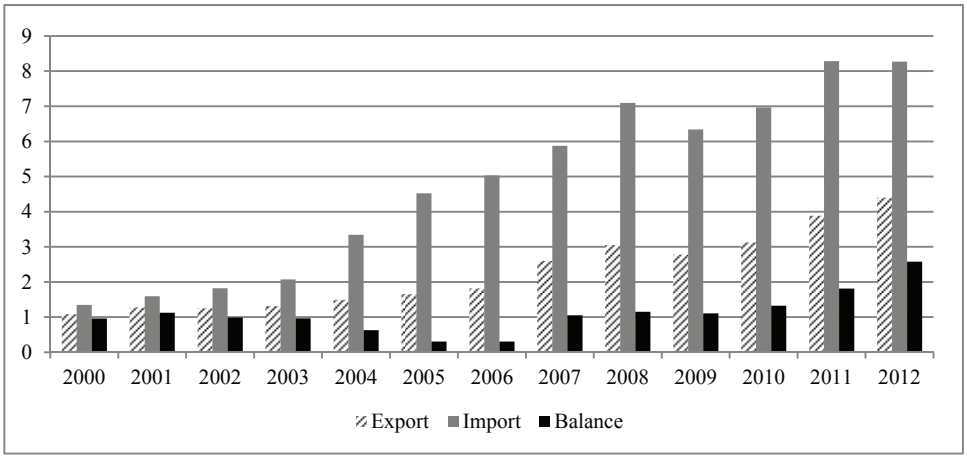
Changes in Hungarian Agri-food Trade

Significant changes have occurred in Hungarian agri-food trade with the EU-27 over the period. Agri-food exports to the EU-27 more than quadrupled, in real terms, from 1999 to 2012, while agri-food imports increased more than eightfold, resulting in a decrease in the export/import ratio (Figure 1). However, although

Hungary's agri-food trade balance with the EU-27 worsened significantly between 2004 and 2006, it has since risen to exceed pre-accession levels.

F i g u r e 1

Hungarian Agri-food Trade with EU-27, 1999 – 2012 (1999 = 1)



Source: Own composition based on Eurostat (2013).

Accession has enhanced the value of agri-food trade with the EU countries (Fertő, 2008) and has changed the structure of agri-food exports and imports. As Table 1 suggests, just 55% of Hungarian agri-food exports and 61% of agri-food imports with the EU-27 were similar in structure in 2012 compared to 1999. Thus, Hungary has traded quite different agri-food products in different quantities with the EU after 2004.

T a b l e 1

Changes in Hungarian Agri-food Trade Structure by Correlation Coefficients (1999 = 100)

Trade flow	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Export	94.01	90.14	83.97	76.90	75.35	74.27	73.27
Import	89.98	85.17	87.06	84.15	75.40	65.71	64.11
Trade flow	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	
Export	62.67	63.96	65.97	63.78	60.93	55.20	
Import	61.06	60.74	59.77	60.82	62.48	60.79	

Source: Own composition based on Eurostat (2013).

The main exports over the period were cereals (mainly maize and wheat), meat and edible meat offal (predominantly frozen meat and preparations of swine), oil seeds (mainly sunflower seeds), residues from the food industries (principally preparations for animal feeding) 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-27 was around 55% in the period analysed, indicating a high but stable 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), meat (mainly frozen swine meat), miscellaneous edible preparations (predominantly coffee extracts, sauces and ice cream), dairy products (principally cheese) and preparations of cereals (mainly bread, pastry and cakes). Their overall share was around 43% over the period, showing a high but stable concentration (Table 2). No major changes among the shares of the top 5 imports occurred after accession. Note, however, that product group 2 and 23 appear in the top 5 for both exports and imports, indicating intra-industry trade.

T a b l e 2

Top 5 Agri-food Product Groups of Hungary (in %), 1999 – 2012*

Export				Import			
Product**	1999 – 2003	2004 – 2008	2009 – 2012	Product**	1999 – 2003	2004 – 2008	2009 – 2012
Cereals (10)	0.11	0.18	0.20	Residues (23)	0.12	0.11	0.11
Meat (02)	0.22	0.15	0.12	Meat (02)	0.07	0.09	0.10
Oil seeds (12)	0.07	0.08	0.10	Misc. Edible (21)	0.09	0.08	0.08
Residues (23)	0.06	0.08	0.07	Dairy products (04)	0.06	0.08	0.08
Vegetable preparations (20)	0.09	0.08	0.06	Cereal prep. (19)	0.08	0.07	0.06
TOP5 total	0.55	0.57	0.55	TOP5 total	0.42	0.43	0.43

* Top 5 products in HS2 classification according to their shares in total Hungarian agri-food trade with EU-27, in descending order based on 2009 – 2012 averages. Note that 2009 – 2012 contains only four years while other periods contain five.

** See full names in HS2 Trade Classification, HS2 product codes are in brackets.

Source: Own composition based on Eurostat (2013).

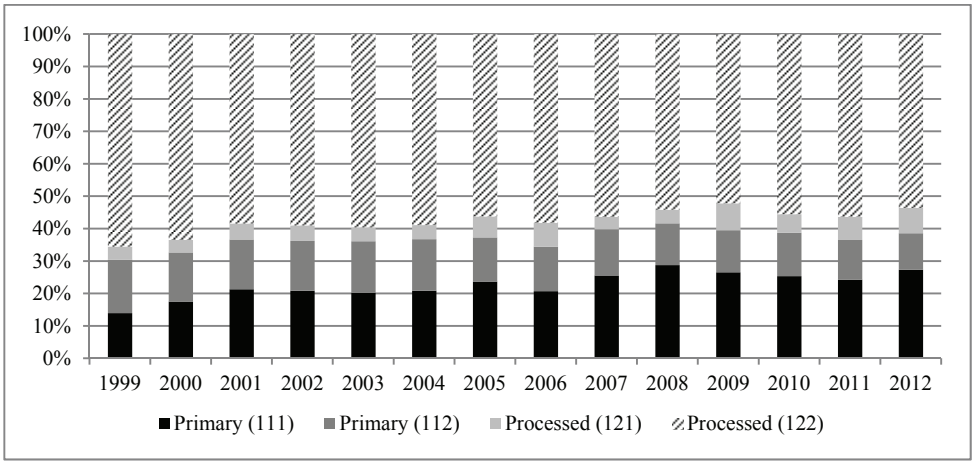
In analysing Hungarian agri-food trade by degree of processing, it becomes apparent that both agri-food exports and imports are mainly based on processed products (Figure 2 and 3). More than 60% of Hungarian agri-food exports was processed (Figure 2). The share of Hungarian primary agri-food exports to the EU-27 increased somewhat in total agri-food exports after accession, from 30% in 1999 to 39% in 2012. This growth was basically due to the increase of primary agri-food exports for industry processing (111), principally led by wheat exports, the share of which almost doubled from 1999 to 2012.

On the import side, the share of primary products also increased somewhat (from 18% in 1999 to 25% in 2012) after accession in line with the decrease of

processed products in agri-food imports from the EU-27. Processed products for household consumption (122) had the greatest share in Hungarian agri-food imports from the EU-27 before accession and this situation has not changed after 2004 (Figure 3). The high share of processed agri-food products, mainly for household consumption (122), in the case of both exports and imports, suggests intra-industry trade.

F i g u r e 2

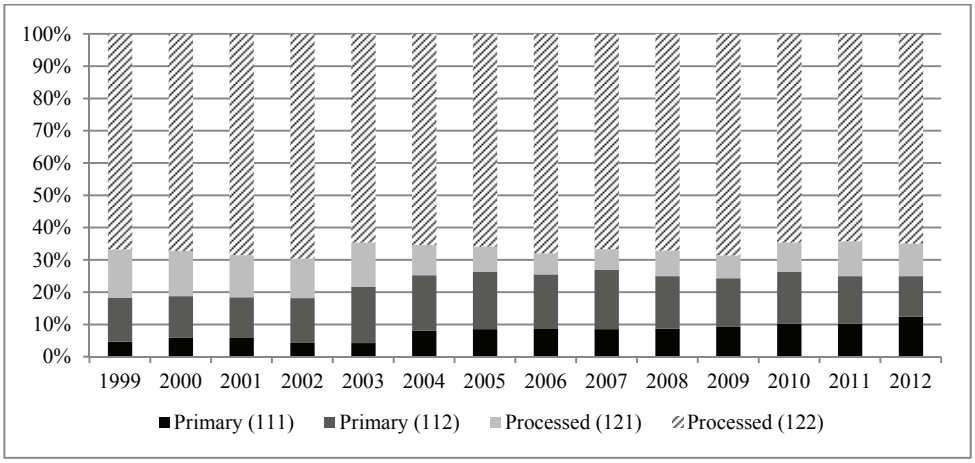
Structure of Hungarian Agri-food Exports to EU-27 by Degree of Processing, 1999 – 2012



Source: Own composition based on Eurostat (2013).

F i g u r e 3

Structure of Hungarian Agri-food Imports from EU-27 by Degree of Processing, 1999 – 2010



Source: Own composition based on Eurostat (2013).

In summary, it can be concluded that accession has enhanced the value of trade relations with the EU and that Hungary's agri-food imports have increased faster than agri-food exports, but the trade balance has risen from 1999 to 2012. Both exports and imports are highly and increasingly concentrated by product group, with exports and imports increasingly based on bulk raw materials but dominated by processed products. Moreover, Hungary has traded quite different agri-food products in different quantities with the EU after 2004. All this suggests that Hungary, as a traditional agricultural exporter, has started to increasingly import those raw materials which previously were produced domestically.

Specialisation of Hungarian 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 RSCA indices various patterns of Hungarian agri-food trade specialisation become apparent (Table 3). First, only three (live animals, cereals and residues) of 24 main product groups had a revealed comparative advantage in all three periods (RSCA > 0). Moreover, the RSCA index of 18 of these product groups declined after accession, implying deterioration in comparative advantage. The highest RSCA index (0.75) is for vegetable planting materials, whilst the lowest is for lac and gums (–0.97), both in the pre-accession period.

Going into detail, live animals and meat had a comparative advantage in all but the last period, though their advantage is decreasing. As the Hungarian animal husbandry sector has been under greater pressure, due to increasing input and competitive output prices since the economic and food crisis starting in 2007/2008, the loss of competitive positions is not a surprising result. Fish products had a comparative advantage in the pre-accession period, probably based on re-export, but as the country is land-locked the significant decrease of RSCA indices is neither surprising. The disadvantageous position of dairy products can partly be explained by the animal sector crisis (similarly to products of animal origin) and partly by the fact that regional competitors are good at producing fresh dairy products (mainly milk and cheese). Although 20% of the surface of Hungary is wooded, national live tree exports are not competitive.

However, it is surprising that competitive positions of fruit and vegetables, traditional Hungarian specialities, are decreasing, which might be explained partly by changing consumer habits. Hungarian agriculture is not specialised in coffee, tea and cocoa making, nor in lac and gums or tobacco, because of geographical conditions, so the disadvantageous positions of these products is understandable. Around 80% of agricultural land in the period analysed was arable land and Hungarian agriculture focused on the export of cereals – this explains

the comparative advantage of cereals, but not its decrease. On the contrary, products of the milling industry have experienced an increase in their comparative advantage, mainly due to a wheat and maize starch export boom. Hungary was famous for its oilseeds during and after the socialist era, but loss of previous markets and the increasing competition has not favoured these products.

The loss of markets in vegetable plaiting materials, actually consisting of reeds and rushes, is surprising, as is the favourable position of sugar products as just a single sugar factory remained in Hungary after 2008. Food preparations in general have deteriorating comparative advantages, mainly in line with the declining and aging food industry. The modest advantage of residues is mainly based on the production of animal feeding products which the country seems to be good at. Last but not least, the comparative disadvantage of beverages is strange as the country has excellent wines, beers and spirits (including the well-known pálinka) – though it seems that these are not well marketed in EU-27 markets.

T a b l e 3

RSCA of Hungarian Agri-food Trade with EU by Main Product Group, 1999 – 2012

Product group	1999 – 2003	2004 – 2008	2009 – 2012
01: Live animals	**0.20**	**0.12**	**0.10**
02: Meat and edible meat offal	**0.29**	**0.20**	–0.01
03: Fish, crustaceans, molluscs	**0.23**	–0.21	–0.65
04: Dairy produce	–0.54	–0.43	–0.47
05: Products of animal origin	**0.22**	–0.07	–0.36
06: Live trees and other plants	–0.15	–0.67	–0.60
07: Edible vegetables	–0.01	–0.11	–0.29
08: Edible fruits and nuts	–0.14	–0.26	–0.43
09: Coffee, tea, mate and spices	–0.23	–0.43	–0.48
10: Cereals	**0.36**	**0.36**	**0.27**
11: Products of the milling industry	–0.54	–0.55	–0.37
12: Oil seeds	**0.10**	–0.14	–0.23
13: Lac and gums	–0.97	–0.95	–0.94
14: Vegetable plaiting materials	**0.75**	**0.19**	–0.02
15: Animal or vegetable fats and oils	–0.31	–0.46	–0.55
16: Preparations of meat	–0.02	–0.22	–0.45
17: Sugars and sugar confectionery	–0.44	**0.01**	**0.12**
18: Cocoa and cocoa preparations	–0.46	–0.37	–0.56
19: Preparations of cereals	–0.52	–0.53	–0.60
20: Preparations of vegetables and fruits	**0.04**	–0.06	–0.18
21: Miscellaneous edible preparations	–0.22	–0.22	–0.15
22: Beverages, spirits and vinegar	–0.57	–0.60	–0.49
23: Residues and waste from the food industries	**0.22**	**0.24**	**0.21**
24: Tobacco	–0.46	–0.56	–0.53

Note: Those indices in bold reveal a comparative advantage.

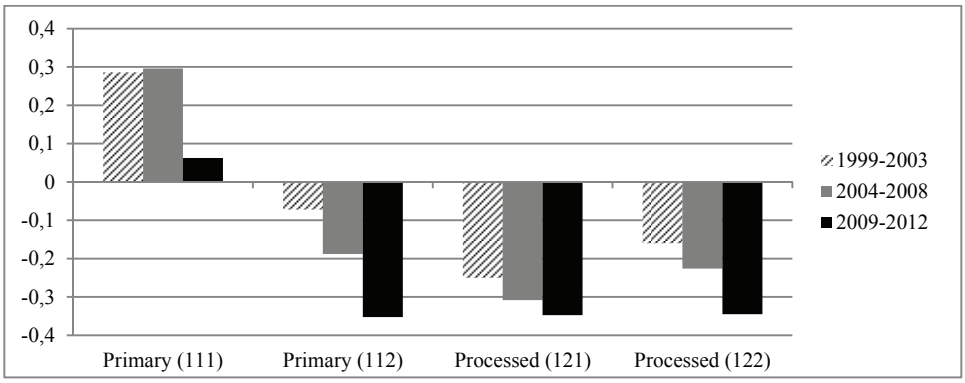
Source: Own calculations based on Eurostat (2013).

Comparing these results with those in Table 2, all top five export product groups had an RSCA > 0 before accession, but only two (cereals and residues) after accession. On the import side, of the top five product groups all but one

(residues) reveal an RSCA < 0 after 2004. In general, it seems that raw materials like wheat, maize or swine meat have comparative advantages, while processed products lack these in the majority of cases. This becomes visible by analysing comparative advantage by degree of processing. It is evident that only primary products for industry processing (111) reveal a comparative advantage in all periods (Figure 4), while initial disadvantageous positions of processed products have become even worse after accession. All the groups experienced a decrease in their RSCA index after accession, while all but one group (111) showed a revealed comparative disadvantage (RSCA < 0) after accession.

F i g u r e 4

RSCA of Hungarian Agri-food Trade with EU-27 by Degree of Processing, 1999 – 2012



Source: Own calculations based on Eurostat (2013).

Similar conclusions can be drawn if analysing the changing distribution of the RSCA index over time. Table 4 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 2012. The share of RSCA < 0 indicates that a majority of products had a revealed comparative disadvantage over the entire period, and that this majority was larger in the post-accession period. Standard deviations of the RSCA indices of individual product groups over the whole sample are quite high, suggesting variation from year to year, and they seem to remain relatively stable over the entire period.

In further analysing the changes of revealed comparative advantage in Hungarian agri-food trade, its duration was estimated by the using the non-parametric Kaplan-Meier product limit estimator. As described in the methodology section, equation 5 was run on our panel dataset and results confirm that the

survival times of revealed comparative advantage in agri-food trade are not persistent over the period analysed (Table 5). Irrespective of the specific product group, survival chances of 97% at the start of the period fell to 7 – 29% by 2012, 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 lowest is for residues (23). The equality of the survival functions across product groups can be checked using two non-parametric tests (Wilcoxon and log-rank). 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 5).

T a b l e 4

The Distribution of the RSCA Index by Year

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Mean	–0.07	–0.07	–0.07	–0.11	–0.08	–0.25	–0.18	–0.16	–0.18	–0.20	–0.20	–0.36	–0.35	–0.36
Standard Deviation	0.70	0.71	0.71	0.71	0.71	0.70	0.69	0.69	0.69	0.69	0.70	0.68	0.68	0.67
RSCA < 0	0.56	0.56	0.56	0.57	0.55	0.65	0.61	0.61	0.60	0.59	0.60	0.68	0.68	0.68
RSCA > 0	0.44	0.44	0.44	0.43	0.45	0.35	0.39	0.39	0.40	0.41	0.40	0.32	0.32	0.32

Source: Own calculations based on Eurostat (2013).

T a b l e 5

Kaplan-Meier Survival Rates for RSCA Index and Tests for Equality of Survival Functions in Hungarian Agri-food Trade with EU by Main Product Groups, 1999 – 2012

Years	Survivor function	Cereals (10)	Meat and edible meat offal (02)	Oil seeds (12)	Residues and waste (23)	Prep. of vegetables and fruits (20)
1999	0.9649	0.9641	0.9763	0.9706	0.9634	0.9747
2000	0.9301	0.9390	0.9517	0.9337	0.9313	0.9503
2001	0.8957	0.9259	0.9302	0.9047	0.9043	0.9210
2002	0.8571	0.8911	0.9032	0.8777	0.8690	0.8905
2003	0.8192	0.8960	0.8725	0.8424	0.8465	0.8565
2004	0.7586	0.8374	0.8301	0.7753	0.8143	0.8074
2005	0.7107	0.8029	0.7877	0.7355	0.7623	0.7603
2006	0.6616	0.7655	0.7367	0.6845	0.7351	0.7227
2007	0.6120	0.7341	0.6908	0.6214	0.7255	0.6688
2008	0.5581	0.7104	0.6472	0.5593	0.7148	0.6025
2009	0.4969	0.6547	0.5877	0.4977	0.6910	0.5264
2010	0.3797	0.5728	0.4862	0.3915	0.5962	0.4261
2011	0.2427	0.4058	0.3466	0.2521	0.4697	0.3031
2012	0.0767	0.2536	0.1386	0.1121	0.2936	0.1354
Log-rank test	0.0000					
Wilcoxon test	0.0000					

Source: Own calculations based on Eurostat (2013).

In general, our results are in line with the majority of literature in the field. The considerable loss of comparative advantage is evident in several papers (Qineti, Rajcaniova and Matejkova, 2009; Fertő, 2008; Jambor, 2013), while it is

also confirmed that bulk primary raw agricultural commodities had higher relative trade advantages compared to consumer-ready foods, which Bojnec and Fertő (2008) ascribed to "competitiveness shortcomings in food processing and in international food marketing". It is also shown that national agri-food trade is highly concentrated, though the concentration has not changed significantly after EU accession (Jambor, 2013). However, contrary to some previous works (Bojnec and Fertő, 2008, Torok and Jambor, 2013), it is not evident that Hungarian agri-food trade is based on raw material export – its share is increasing, but processed food dominates agri-food export as well as import.

Discussion

The changes above can be explained by various factors, some of which can be highlighted some from a policy perspective. First, we believe that one of the most important external causes behind the loss of comparative advantage is the change 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 EU-15 are much more price-competitive in the national market than are Hungarian raw materials in EU-15 markets.

Another important external factor, we suggest, has been the tough adjustment to new market conditions. EU membership has made Hungary, and indeed all the NMS, part of a much larger and very competitive market. Whilst this offers tremendous opportunities, the NMS are faced with significantly increased competition in their domestic markets. This situation reflects the rapid emergence of vertically coordinated food chains, creating very strong price competition. Although consumers are generally the beneficiaries of these changes, producers are not always able to adjust, or to cope with the business practices employed by the large chains.

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.

We believe that the subsidy policy of competitors is also important as an external cause. The traditionally high agricultural subsidies of the EU-15 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.

We are aware that these arguments should be treated with care, as the methodology has a number of limitations. First, trade data are not fully reliable for a number of reasons. Trade values do not necessarily sum up to the total trade value for a given country dataset, countries do not necessarily report their trade values for each and every year, trade data differ by the selection of classification and so on, imports reported by one country do not coincide with exports reported by its trading partner. Second, Balassa-based indices are sensitive to zero values (see equation 1, for instance). Third, selection of a different trading partner, for example EU-15, NMS or other, might alter our results. However, based on the literature review and previous empirical works, our results are in line with initial expectations.

Conclusions

The article has analysed the changing product structure and comparative advantages of agri-food trade with the EU-27 in the case of Hungary and has reached a number of conclusions. First, accession has enhanced the value of trade relations with the EU, though Hungary's agri-food imports have increased faster than agri-food exports, but the trade balance still exceeds pre-accession levels. Both exports and imports are highly concentrated by product group, and both agri-food exports and imports are mainly based on processed products, though the share of raw materials is increasing. Second, results show that revealed comparative advantages have weakened after accession. Indeed, the majority of products had a revealed comparative disadvantage over the entire period, and this majority was larger in the post-accession period. Only three of 24 main product groups had a revealed comparative advantage in all three periods, while the RSCA index of 18 of these product groups declined after accession. Third, all top five export product groups had a comparative advantage before accession, but only two after accession. On the import side, just a single product group had a comparative advantage after 2004. In general, it seems that raw materials, like wheat, maize or swine meat, have comparative advantages, while processed products lack these in the majority of cases. Fourth, using a non-parametric Kaplan-Meier product limit estimator to analyse the duration of revealed comparative

advantage in Hungarian agri-food trade, 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. Fifth, the discussion went beyond the description of results and tried to identify the main reasons behind these various changes. In the future, it would be necessary to calculate other indices for other countries and regions to make these results more valid. It might also be a good idea to analyse other sectors from this aspect so that it would be clear whether such a decline in comparative advantage is agriculture-specific or pertains to other sectors as well.

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