Comparative Advantages and Competitiveness of Hungarian and Slovenian Agro-Food Trade in the EU Markets

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Abstract. The paper investigates comparative advantages and competitiveness of Hungarian and Slovenian agro-food trade in the EU markets. Applying a highly disaggregated trade dataset, we describe the pattern of agro-food trade in Hungary and Slovenia using the Balassa index. The extent of trade specialization exhibits a declining trend. Both countries have lost comparative advantage for a number of product groups over time. The indices of specialization have tended to converge. For particular product groups, the indices display greater variation. They are stable for product groups with comparative disadvantage, but product groups with weak to strong comparative advantage show significant variation. The price competition, quality competition and the one-way trade are also analyzed using extended [1] approach. In Hungarian matched two-way agro-food trade the prevalence is on successful price competition and on successful non-price or quality competition suggesting comparative advantages for Hungarian agro-food products vis-à-vis bilateral trading partners. In Slovenian matched two-way agro-food trade the prevalence is on the non-successful price competition and on the non-successful quality competition suggesting comparative trade disadvantages vis-à-vis bilateral trading partners.

Keywords: Comparative Advantage, Price Competition, Agro-Food Trade.

1. INTRODUCTION

Limited research is available to investigate comparative advantages in Central and Eastern European (CEE) countries [2, 3]. Similarly, research on competitiveness of agriculture in CEE countries employing trade data is also scarce. Both of the analyses are particularly relevant for the new European Union (EU) member countries, which during the last fifteen years have undergone transition from central planning to a market economy and rapid adjustments to the EU membership. While one might expect that trade opening, free trade and association agreements, and the EU membership have induced substantial changes in structures of agro-food trade flows, there is limited evidence on the magnitude and patterns in trade types potentially caused by these processes. Therefore, the aim of this paper is to investigate the comparative advantages and magnitude and dynamics of trade types in agro-food trade between the selected two new EU member countries (Hungary and Slovenia, respectively) and their main trading EU-15 member countries (Austria, Germany and Italy, respectively). More specifically, we aim to investigate whether there is any catching up in these processes to derive policy implications.

The paper investigates on comparative advantage and price competitiveness of Hungarian and Slovenian agro-food trade in the EU markets employing different methodologies. To conduct in-depth empirical analysis we employ a highly disaggregated OECD dataset by the years 1993-2003. First, we have focused on the nature of comparative advantage of the Hungarian and Slovenian agriculture in the EU markets. We describe the evolving pattern of agro-food trade in Hungary and Slovenia using recently developed empirical procedures based around the classic Balassa index. Second, we apply the extended [1] approach to assess the price competitiveness of Hungarian and Slovenian agro-food trade in their main EU markets.

The structure of the paper is organized as follows. In the second section we present methodology. In the third section there are described data used and presented the empirical results in two steps. First, we analyze the comparative advantages and their dynamics. Second, we investigate the trade magnitude and trade patterns focusing on investigation whether in bilateral agro- food trade there is prevalence on the one- way or on the two- way directions of trade. We separate the two- way trade in price competition and quality competition categories adopting [1] to investigate catching up in the successful price and successful non- price competition categories in the matched two- way trade flows. We emphasize the importance of mobility in trade patterns using Markov's probability transition matrix suggesting a greater stability in trade patterns over time. The final section concludes.

2. CONCEPTURAL ISSUES AND METHODOLOGY

2. 1 Conceptual issues in competitiveness and comparative advantage analyses

The term of competitiveness is commonly used in economic research and in public debate. However, there is little agreement on its definition among scholars. One can observe an explosion of interest in the concept of competitiveness from various points of view over the last decade, resulting in considerable confusion in relation to the scope of the term. Thus, [4, p. 386] note that "much of the diversity concepts and measures of competitiveness emanates from the variety of perspectives and objectives of the relevant research".

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

Defining the competitiveness of nations is a controversial issue. Researchers interested in analyzing a nation's competitiveness have defined it as the ability of a nation to sustain an acceptable growth rate and real standard of living for its people while efficiently providing employment without reducing growth potential and the standard living of the next generation. However, some other authors they emphasize that the term of competitiveness of a nation does not make a sense (e.g. often cited references are [5, 6].

National competitiveness is related to the concept of comparative advantage. The theory of comparative advantage predicts that trade flows exist as a result of relative cost differences between trading partners. It suggests that countries are competitive in goods and services in which they have a relative cost advantage. The only difference between comparative advantage and competitiveness is that the latter includes market distortions, whereas the former does not. [7] emphasized the role of distortion in agricultural markets and thus asserted that competitiveness takes a more realistic view about the world. [8] shed light on two additional differences between comparative advantage and competitiveness. First, competitiveness usually involves a cross- country comparison for a particular product, whilst comparative advantage is measured between products within a country. Second, competitiveness is subject to changes in macroeconomic variables, whereas comparative advantage is structural in nature. Thus empirical analyses that focus on comparative advantage and competitiveness may lead different results. For example, [3] provide evidence that results focusing on both competitiveness and comparative advantage produce different results for Hungarian agriculture.

Both comparative advantage and competitiveness are based on the concept of general equilibrium. [9] point out the necessity of a general equilibrium framework to evaluate competitiveness, because only this approach can take into account all interdependencies of an economy. Although such analyses are highly desirable, they are not too frequently carried out because of the complexity involved and the data constraints. A considerable part of the research in this area investigates only one part of the economy, e.g. an industry or a company, and it approximates or neglects any economy-wide interdependencies.

Moreover, [9] and [10] emphasize the dynamic aspects of competitiveness. The main reason for this is that these authors define competitiveness as being strongly linked to economic growth and the concept of welfare maximization in the long run. However, traditional trade theory does not address the dynamics of competitiveness and trade patterns, and therefore is deficient from this point of view.

This paper is concerned with the mesoeconomic level. Therefore the definition of competitiveness most appropriate is that pertaining to the industry level. The ability to compete in international and domestic markets depends on price competitiveness and/or product quality. Unit value approach allows us to investigate the price competitiveness of Hungarian and Slovenian agriculture and the food sector. In addition, employing trade data this can contribute to a better understanding of the evolution in the comparative advantage of both countries' agriculture and the food sector.

2.2. Methodology

The nature of comparative advantage and the price competitiveness in trade data are the main methodological approaches that are applied in this paper. The concept of 'revealed' comparative advantage, introduced by [11] but refined and popularized by [12] and therefore known as the 'Balassa index', is widely used empirically to identify a country's weak and strong export sectors. [5] uses it to identify strong sectoral clusters, [13] (1998) analyses specialization patterns in Europe, [14] and [15] focus on the dynamics of comparative advantage, [2] analyses agricultural trade, [16, 17] study the (dynamics of the) empirical distribution of European and Chinese trade, and [18] analyze competitiveness in Hungarian agro-food sectors.

The Revealed Comparative Advantage (RCA) index is defined by Balassa (B) [12] as follows:

$$B = (xij / xrj) / (xis / xrs) \quad (1)$$

where x represents exports, i is a commodity, j is a country, r is a set of commodities and s is a set of countries. B is based on observed trade export patterns; it measures a country's exports of a commodity relative to its total exports and to the corresponding export performance of a set of countries. If B>1, then a comparative advantage is revealed, i.e. a sector in which the country is relatively more specialized in terms of exports. In our case x_{ij} describes Hungarian and Slovenian exports for a particular product group to EU3 countries (Austria, Germany and Italy), while x_{is} is total agro-food of Hungary and Slovenia to EU3. X_{rj} denotes the EU3's exports for a given product and x_{rs} total agro-food exports by EU3 countries, which are used as the benchmark of comparison.

Our investigations are focused on the stability of the B trade indices over time. One can distinguish at least two types of stability [16]: (i) stability of the distribution of the indices from one period to the next; and (ii) stability of the value of the indices for particular product groups from one period to the next.

The first type of stability is investigated in the following way. Following [19] we use B in regression analysis:

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

where superscripts t1 and t2 describe the start year and the end year, respectively. The dependent variable, the value of B at time t2 for sector i in country j, is tested against the independent variable which is the value of B in year t1; α and β are standard linear regression parameters and ϵ is a residual term. If $\beta=1$, then this suggests an unchanged pattern of B between periods t1 and t2. If $\beta>1$, the existing specialization of the country is strengthened. If $0<\beta<1$, then commodity groups with low (negative) initial B indices grow over time, while product groups with high (positive) initial B indices decline. The special case is where $\beta<0$ indicates a change in the sign of the index. However, [19] point out that $\beta>1$ is not a necessary condition for growth in the overall specialization pattern. Thus, following [20], they argue that:

$$\sigma_i^{2t2} / \sigma_i^{2t1} = \beta_i^2 / R_i^2, \quad (3a)$$

and hence,

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

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

The second type of stability that is of the value of the trade index for particular product groups, this is also analyzed in two ways. First, following a recent empirical method pioneered by [14] and applied by [21] and [16], we employ transition probability matrices to identify the persistence and mobility of revealed comparative advantage as measured by the B index. There is no accepted guide in the literature for classification of B index into appropriate categories. Most studies classify data into various percentiles, like quartiles or quintiles. [16] point out that this classification has several drawbacks. First, boundaries between classes are difficult to interpret. Second, they also differ from one country to another; therefore it makes cross-country comparisons difficult. Consequently, following [16], we divide the B index into four classes:

Class a: $0<B\leq 1$;

Class b: $1<B\leq 2$;

Class c: $2<B\leq 4$;

Class d: $4<B$.

Class a refers to all those product groups without a comparative disadvantage. The other three classes, b, c, and d, describe the sectors with a comparative advantage, roughly classified into weak comparative advantage (class b), medium comparative advantage (class c) and strong comparative advantage (class d).

Second, the degree of mobility in patterns of specialization can be summarized using indices of mobility. These formally evaluate the degree of mobility throughout the entire distribution of B indices and facilitate direct cross-country comparisons. The first of these indices (M_1, following [22]) evaluates the trace (tr) of the transition probability matrix. This index thus directly captures the relative magnitude of diagonal and off-diagonal terms, and can be shown to equal the inverse of the harmonic mean of the expected duration of remaining in a given cell.

$$M_1 = \frac{K - tr(P)}{K - 1}, \quad (4a)$$

where K is the number of cells, and P is the transition probability matrix.

The second index (M_2, after [22] and [23]) evaluates the determinant (det) of the transition probability matrix.

$$M_2 = 1 - |\det(P)|. \quad (4b)$$

In both indices, a higher value indicates greater mobility, with a value of zero indicating perfect immobility.

Besides the nature of comparative advantage, we also employ the methodological approach that distinguishes between price and non-price competitiveness in matched two-way trade from the one-way trade. Unit values of exports and imports by products have been often used for assessing price competitiveness and product quality in two-way matched trade data (e.g. [24], [25], [26], [27]). [1] employ the unit value difference and the trade balance by product to categorize trade flows in four categories:

Category 1. $TB_{(i,j)} > 0$ (or $V^x_{(i,j)} > V^m_{(i,j)}$) and $UVD_{(i,j)} < 0$ (or $UV^x_{(i,j)} < UV^m_{(i,j)}$)

Category 2. $TB_{(i,j)} < 0$ (or $V^x_{(i,j)} < V^m_{(i,j)}$) and $UVD_{(i,j)} > 0$ (or $UV^x_{(i,j)} > UV^m_{(i,j)}$)

Category 3. $TB_{(i,j)} > 0$ (or $V^x_{(i,j)} > V^m_{(i,j)}$) and $UVD_{(i,j)} > 0$ (or $UV^x_{(i,j)} > UV^m_{(i,j)}$)

Category 4. $TB_{(i,j)} < 0$ (or $V^x_{(i,j)} < V^m_{(i,j)}$) and $UVD_{(i,j)} < 0$ (or $UV^x_{(i,j)} < UV^m_{(i,j)}$)

where the trade balance ($TB_{(i,j)}$) is calculated as $TB_{(i,j)} = V^x_{(i,j)} - V^m_{(i,j)}$ where $V^x_{(i,j)}$ is the value of the *i*-th product exports from a home (domestic) country to the *j*-th partner country and $V^m_{(i,j)}$ is the value of the *i*-th product imports to the home country from the *j*-th partner country. In other words, one country's exports are another country's imports, and vice versa. The unit value difference ($UVD_{(i,j)}$) is calculated as $UVD_{(i,j)} = UV^x_{(i,j)} - UV^m_{(i,j)}$ where $UV^x_{(i,j)}$ is the export unit value, which is calculated as $UV^x_{(i,j)} = V^x_{(i,j)} / Q^x_{(i,j)}$ and $UV^m_{(i,j)}$ is the import unit value, which is calculated as $UV^m_{(i,j)} = V^m_{(i,j)} / Q^m_{(i,j)}$. In these calculations, $Q^x_{(i,j)}$ and $Q^m_{(i,j)}$ are quantities of exports and imports, respectively, between the home country *i* and the partner country *j*. Trade balances indicate successful or unsuccessful competition in trade and export-import unit values determine price or non-price competition. We additionally disentangle the one-way trade from the two-way matched trade. When the one-way trade occurs then the net direction of trade is either surplus, which consists only from exports or deficit, which consists only from imports. For the *one-way* trade we distinguish the two possible one-way categories, i.e. only one-way export category or only one-way import category, that occur when holds the following conditions:

Only export category: $TB_{(i,j)} > 0$ (or $V^x_{(i,j)} > 0$, $V^m_{(i,j)} = 0$) and $UV^m_{(i,j)} = 0$

Only import category: $TB_{(i,j)} < 0$ (or $V^x_{(i,j)} = 0$, $V^m_{(i,j)} < 0$) and $UV^x_{(i,j)} = 0$

The GP [1] approach of four competition categories is applied only on the matched *two-way* trade flows satisfying the simultaneous conditions of the unit value difference and the trade balance by product. In the matched two-way trade flows in the first and third

categories the home country *i* is successful in price and non-price competition, respectively, and vice versa in the second and fourth categories where the home country is unsuccessful in price and non-price competition.

To study catch up in trade patterns, we analyze the stability of the trade type categories for particular product groups. This is analyzed similarly as in the case of the Balassa (B) index in two ways. First, we employ Markov's transition probability matrices to investigate the changes in the price competition and quality competition categories in the two-way matched trade over the time. Second, the degree of mobility in trade type patterns is summarized using indices of mobility.

Finally, we also conducted consistency tests as a cardinal measure of comparative export advantage. The consistency test is based on the simple calculation of relative frequency between pairs of the B index of classes of comparative export advantages and the extended GP trade types' categories.

3. DATA AND EMPIRICAL RESULTS

To conduct the empirical analysis on trade types in the bilateral Hungarian and Slovenian agro-food trade, respectively, with the main EU partners' countries (Austria, Germany and Italy), we use detailed trade data from OECD by the years 1993-2003. Agro-food trade is defined by [28]. Sample consists of 255 items at four-digit level in Standard International Trade Classification (SITC) system.

3.1. Comparative export advantages

Comparative advantages are measured in two ways. Firstly, by the median value of the B index. There is neither significant difference in the levels nor in the patterns of the median value of the B index for Hungarian and Slovenian agro-food exports to the EU3 markets. As can be seen from Figure 1, neither Hungary nor Slovenia enjoyed comparative advantage in agro-food exports to the EU3 markets. The median value of the B index less than 0.8 clearly indicates comparative export disadvantage. The value of the B index tends to deteriorate over time indicating the deterioration of comparative export advantages. Secondly, by the proportion of agro-food products that the country (Hungary or Slovenia) explored the comparative export advantages (B>1) in the EU3 markets. In our case, this somehow turned out as an inverse reflection of the median value of the B index. Whereas the median value of the B index deteriorates close to a 0.6 value, the share of product groups B>1 tends to decline to less than a 0.4 value or less than 40 percent. The latter indicates that less than 40 percent of agro-food exports from Hungary and a bit less from Slovenia to the EU3 markets can be included in the group with the comparative export advantages, and vice versa, more than 60 percent of Hungarian or even more for Slovenian agro-food exports to the EU3 markets there is comparative export disadvantage.

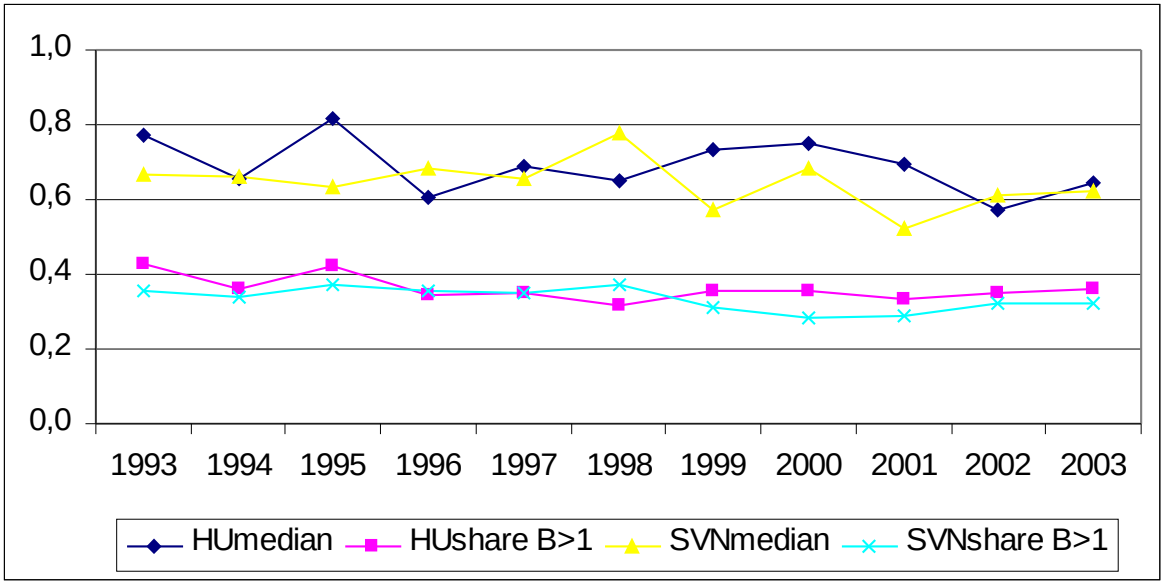

Figure 1. Median and the share of product groups B>1 in Hungary and Slovenia

Table 1 present the stability of the B index between the start year and the end year of the analyzed period 1993- 2003. The β values $0<\beta<1$ suggest that commodity groups with low (negative) initial B indices are likely to grow over time, whereas product groups with high (positive) initial B indices decline. In our case the β values are positive, but a slightly different for Hungary and Slovenia. For Slovenia, the β value is close to the zero indicating that the hypothesis of reverse patterns of the B value can not be rejected and that trade patterns have changed over the analyzed period. For Hungary, the β value is also closer to the zero (less than 0.5), but greater than for Slovenia. This implies possible a changed pattern of the B index between the years 1993 and 2003. The values of the β/R differ between Hungary and Slovenia. For Hungary the β/R value close to one suggests that the dispersion in the distribution of the B index has not changed significantly. On the other hand the β/R value for Slovenia that is greater than one indicates that the pattern of the distribution of the B index has changed and that the degree of specialization increased.

Table 1 Stability of the B index between 2003 and 1993

	β	p value	R^2	β/R	N
Hungary	0.447	0.000	0.250	0.894	132
Slovenia	0.085	0.667	0.002	1.950	98

Source: Own calculation based on OECD database.

The dynamics of the B index is also investigated by the analysis of the Markovian transition matrices and mobility indices. This analysis shows the probability of passing from one state to another between the starting year (1993) and the ending year (2003) of the analyzed period 1993- 2003 (Table 2). The diagonal elements of the transition matrices indicate that the sectors with a comparative export disadvantage (class a: $0<B\leq 1$) are persistent between 1993 and 2003 for both Hungary and Slovenia. The comparative export disadvantage has remained at similar level at the end of the analyzed period and there is less than a 8 percent chance for Hungary and less than a 7 percent chance for Slovenia of moving from class a to class b, c or d, respectively.

The other three classes, b ($1<B\leq 2$), c ($2<B\leq 4$), and d ($4<B$), describe the sectors with a comparative advantage. For the sectors b, there are lower chances of moving from class b to class c or d than for a backward switch from comparative advantage (class b) to comparative disadvantage (class a). There is a zero percent chance for Hungary to move

from class c to class d, but relatively high chance to move from comparative export advantage class c to comparative export disadvantage class a (67 percent). To a lesser degree it holds also for Slovenia. The backward comparative export advantage deterioration from class d to class a, this is found to be less significant: once the product achieved strong comparative export advantage (class d) then there is a 10 per cent chance for Hungary of moving from class d to class a, whereas this is a 15 percent for Slovenia.

The initial and final distribution indicates deterioration in the B indices, which is more considerable for Hungary than for Slovenia. While the initial distribution indicates that 55 percent of agro-food trade for Hungary and 63 percent for Slovenia was within class a with comparative export disadvantage, this increased to 63 percent in final distribution for Hungary and to 65 percent for Slovenia. This shows a greater continuation of the worsening trend in comparative advantage for Hungarian agro-food exports to the EU3 countries between the initial and end years.

Table 2 The transition matrices of the B index and mobility indices (1993-2003)

	Hungary				Slovenia			
	a	b	c	d	a	b	c	d
a	0.87	0.08	0.03	0.03	0.85	0.05	0.07	0.03
b	0.50	0.14	0.18	0.18	0.50	0.25	0.25	0.00
c	0.67	0.22	0.11	0.00	0.50	0.00	0.25	0.25
d	0.10	0.13	0.16	0.61	0.15	0.20	0.10	0.55
initial distribution	0.55	0.16	0.06	0.22	0.63	0.08	0.08	0.21
final distribution	0.63	0.11	0.09	0.18	0.65	0.09	0.10	0.15
M1	0.76				0.70			
M2	0.99				0.97			

Source: Own calculation based on OECD database.

The degree of mobility in patterns of specialization is summarized by the M1 and M2 indices of mobility. For the each country, Hungary and Slovenia, M2 is greater than M1. Between the countries M1 and M2 are a slightly greater for Hungary than for Slovenia. These results indicate that the degree of mobility throughout the entire distribution of B indices is a slightly higher for Hungary than for Slovenia. However, the M2 indices close to one indicates almost perfect mobility.

3.2. Price Competitiveness

When simultaneously comparing trade balance by a product as a proxy for successful competition in trade and unit values as proxies for price competition by the same product, we identify in the pairs of bilateral agro-food trade data by products the one-way trade flows (only exports or only imports) and the matched two-way trade flows. Within the matched two-way trade flows we identify categories of price competition and categories of quality competition where simultaneously exist trade balance by a product and unit export-import values for the same product.

The significance of the Hungarian bilateral one-way trade with the individual EU3 countries increased between 1993 and 1997, but declined and stabilized at around 16 percent. Within the one-way trade, export flows remained the most important, but there is converging pattern as the relative importance of the one-way exports declined, whereas the relative importance of the one-way imports increased. This indicates deterioration of Hungarian agro-food competitiveness within the one-way trade with the EU3 countries. On the other hand relatively high increase in the degree of the

matched two-way agro food trade in 1998 suggests policy shifts toward greater trade liberalization that induces forces for simultaneous exports and imports within the same agro-food product category. Within the two-way matched bilateral agro-food trade for Hungary, the most significant are the category 1, which is consistent with successful price competition and the category 3, which is consistent with successful quality competition. There are some structural shifts with deterioration of the category 1 and increase in the category 3.

When total Hungarian agro-food trade with the EU3 countries is considered, the share of the one-way trade is reduced considerably. As the cumulated size of trade increased, the increase is also recorded in the number of two-way matched traded products. The one-way trade is much more balanced between exports and imports, but Hungary now experienced greater significance in imports than exports in the one-way trade flows. Within the two-way matched trade the categories 1 and 3 are the most significant and patterns over time are more similar for Hungarian bilateral and total two-way trade.

Table 3: Classifying Trade Flows

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Hungary-bilateral											
One-way trade	0.26	0.27	0.25	0.33	0.34	0.15	0.16	0.19	0.16	0.18	0.16
Exports	0.91	0.84	0.81	0.87	0.88	0.72	0.72	0.81	0.70	0.66	0.69
Imports	0.09	0.16	0.19	0.13	0.12	0.28	0.28	0.19	0.30	0.34	0.31
Two way trade	0.74	0.73	0.75	0.67	0.66	0.85	0.84	0.81	0.84	0.82	0.84
Category 1	0.52	0.42	0.31	0.36	0.44	0.37	0.39	0.37	0.34	0.33	0.32
Category 2	0.08	0.11	0.20	0.11	0.08	0.08	0.07	0.08	0.11	0.11	0.13
Category 3	0.31	0.38	0.43	0.44	0.37	0.45	0.45	0.47	0.47	0.47	0.45
Category 4	0.09	0.09	0.06	0.08	0.11	0.10	0.08	0.09	0.08	0.09	0.09
Hungary-total											
One-way trade	0.02	0.11	0.05	0.04	0.07	0.02	0.06	0.05	0.05	0.09	0.04
Exports	0.46	0.83	0.42	0.40	0.68	0.27	0.41	0.51	0.53	0.57	0.42
Imports	0.54	0.17	0.58	0.60	0.32	0.73	0.59	0.49	0.47	0.43	0.58
Two way trade	0.98	0.89	0.95	0.96	0.93	0.98	0.94	0.95	0.95	0.91	0.96
Category 1	0.58	0.44	0.38	0.40	0.34	0.37	0.42	0.30	0.30	0.30	0.34
Category 2	0.06	0.13	0.14	0.10	0.07	0.07	0.04	0.04	0.07	0.07	0.09
Category 3	0.30	0.34	0.40	0.42	0.50	0.45	0.43	0.58	0.54	0.55	0.50
Category 4	0.05	0.08	0.07	0.08	0.10	0.12	0.11	0.08	0.09	0.09	0.07
Slovenia-											

bilateral											
One- way	0	0	0	0	0	0	0	0			0
trade	.24	.31	.31	.26	.30	.20	.32	.32	0.27	0.26	.22
Exports	0	0	0	0	0	0	0	0			0
	.08	.03	.06	.06	.09	.12	.11	.11	0.07	0.08	.13
Imports	0	0	0	0	0	0	0	0			0
	.92	.97	.94	.94	.91	.88	.89	.89	0.93	0.92	.87
Two way	0	0	0	0	0	0	0	0			0
trade	.76	.69	.69	.74	.70	.80	.68	.68	0.73	0.74	.78
Category	0	0	0	0	0	0	0	0			0
1	.32	.33	.29	.27	.30	.27	.31	.30	0.27	0.28	.25
Category	0	0	0	0	0	0	0	0			0
2	.33	.26	.34	.39	.35	.38	.36	.38	0.39	0.38	.40
Category	0	0	0	0	0	0	0	0			0
3	.10	.08	.09	.08	.05	.05	.05	.05	0.05	0.05	.09
Category	0	0	0	0	0	0	0	0			0
4	.24	.34	.28	.27	.29	.30	.28	.27	0.29	0.28	.26
Slovenia-											
total											
One- way	0	0	0	0	0	0	0	0			0
trade	.13	.17	.19	.14	.16	.10	.12	.20	0.18	0.14	.14
Exports	0	0	0	0	0	0	0	0			0
	.00	.01	.01	.01	.01	.01	.00	.00	0.00	0.00	.00
Imports	1	0	0	0	0	0	1	1			1
	.00	.99	.99	.99	.99	.99	.00	.00	1.00	1.00	.00
Two way	0	0	0	0	0	0	0	0			0
trade	.87	.83	.81	.86	.84	.90	.88	.80	0.82	0.86	.86
Category	0	0	0	0	0	0	0	0			0
1	.28	.26	.18	.20	.22	.19	.19	.27	0.25	0.24	.22
Category	0	0	0	0	0	0	0	0			0
2	.34	.31	.40	.39	.38	.43	.26	.37	0.37	0.45	.38
Category	0	0	0	0	0	0	0	0			0
3	.15	.08	.12	.08	.07	.10	.09	.06	0.04	0.06	.11
Category	0	0	0	0	0	0	0	0			0
4	.23	.36	.30	.34	.33	.28	.46	.30	0.34	0.25	.29

Source: Own calculation based on OECD database

The Slovenian one- way bilateral trade with the EU3 countries is more stable and at lower degree. Unlike for Hungary, the one- way import flows for Slovenia are far the most important. Within the two- way matched bilateral trade flows for Slovenia the significant are the category 2 of unsuccessful price competition, which significance tends to increase slightly, then the category 1 of successful price competition, which significance tends to decline, and the category 4 of unsuccessful quality competition, which relative importance increased slightly. The least significant is the category 3 of successful quality competition.

Similar as for Hungary, the relative importance of the one- way trade is less important in total Slovenian agro- food trade with the EU3 countries than in bilateral trade flows. Almost all Slovenian one- way total agro- food trade flows are imports. While there are differences in the relative significance of different categories in Slovenian two- way matched trade flows between bilateral and total agro- food trade with the EU3 countries, again in total trade flows the most significant is the category 2 of unsuccessful price competition, which tends to increase, whereas the category 1 of successful price competition tends to decline over time. The category 4 of unsuccessful quality competition explores oscillations, but its share tends to increase over time, and vice versa for the category 3, which is of lower significance and tends to decline. Therefore,

trade types indicate deterioration in already low degree of successful price and successful quality competition.

The probability to stay the one-way trade (category 0) is relatively high: 81 percent for Hungary and 89 percent for Slovenia (Table 4). The probabilities to stay at the same price or quality competition category (categories from 1 to 4) are lower than that what is found for the one way trade. The probabilities to stay at the same price or quality competition categories vary by individual competition categories and between the countries. For example, for Slovenia, the category 3 of successful quality competition is rather unstable: the probability to stay within this category is only 14 percent. Only Hungary experienced higher probability to stay within the category 1 of successful price competition (48 percent) than within the category 2 of unsuccessful price competition (32 percent), whereas for all other comparisons they are less favorable for the analyzed home countries, i.e. Hungary and Slovenia, respectively. For Hungary, the probability to stay within the category 3 of successful quality competition (42 percent) is a slightly less than to stay within the category 4 of unsuccessful quality competition (43 percent). For Slovenia, the probabilities to stay in the same competition category of successful price/quality competition vis-à-vis unsuccessful price/quality competition are greater: the probability to stay within the category 1 (38 percent) of successful price competition is less than to stay within the category 2 (44 percent) of unsuccessful price competition and the probability to stay within the category 3 (14 percent) of successful quality competition is less than to stay within the category 4 (47 percent) of unsuccessful quality competition. There are also differences in switches between the categories. For Hungary there are shifts from the category 1 of successful price competition to the categories 3 and 4 of successful and unsuccessful quality competition, then from the category 2 of unsuccessful price competition to the categories 0 and 4 of the one-way trade and of unsuccessful quality competition, from the category 3 of successful quality competition to the categories 0, 1 and 4 of the one-way trade, successful price competition and unsuccessful quality competition, respectively, and from the category 4 of unsuccessful quality competition to the categories 0 and 3 of the one-way trade and of unsuccessful price competition. For Slovenia, the switches from the category 1 of successful price competition are equally dispersed among the categories 0, 3 and 4 of the one-way trade, successful and unsuccessful quality competition. The switches from the category 2 of unsuccessful price competition are to the categories 0 and 4 of the one-way trade and of unsuccessful quality competition. For Slovenia, there are the remarkable shifts from the category 3 of successful quality competition to the categories 0 and 2 of the one-way trade and unsuccessful price competition, and something similar, but less remarkable, holds for the shifts from the category 4 of unsuccessful quality competition again to the categories 0 and 2.

Table 4 Markov's Matrices between the Years 1993 and 2003

	Hungary					Slovenia				
	0	1	2	3	4	0	1	2	3	4
0	0.81	0.08	0.06	0.04	0.02	0.89	0.02	0.03	0.00	0.07
1	0.12	0.48	0.05	0.19	0.15	0.19	0.38	0.06	0.19	0.19
2	0.27	0.14	0.32	0.09	0.18	0.26	0.06	0.44	0.03	0.21
3	0.15	0.15	0.09	0.42	0.18	0.36	0.07	0.36	0.14	0.07
4	0.24	0.00	0.29	0.05	0.43	0.23	0.09	0.21	0.00	0.47

Source: Own calculations based on OECD database.

Table 5 summaries mobility indices for total Hungarian and Slovenian agro-food trade with the EU3 countries. The size of the mobility indices for the first period (1993-1998) is greater than for the second period (1999-2003) indicating the decline and more stable trade patterns in the second period with fewer movements across categories. There are some differences in the size of the mobility indices across countries for the sub-period 1993-1998, but not for the sub-period 1999-2003.

Table 5: Mobility Indices

		1993-2003	1993-1998	1999-2003
Hungary	M1	0.63	0.64	0.49
	M2	0.99	1.00	0.95
Slovenia	M1	0.67	0.54	0.49
	M2	1.00	1.00	0.95

Source: Own calculation based on OECD database.

3.3. Comparative export advantages and trade types

We may hypothesize that the products which have strong comparative advantage they are also competitive in terms of successful price or quality competition and vice versa. Similarly product groups with comparative disadvantage probably they have not price or quality competitiveness. The consistency test based on the calculation of relative frequency between paired the B index and extended GP trade type categories are conducted. The results show that 29 per cent of product groups with successful price competitiveness and 24 per cent of product groups with successful quality competitiveness, respectively, have strong comparative advantage in Hungary in 2003 (Table 6). The row 1 shows that 44 per cent of successful price competition has no comparative advantage and row 3 displays that 42 per cent of successful quality competitiveness has no comparative advantage in Hungary in 1993. But, noteworthy is that 95 per cent of unsuccessful price and quality competitiveness, respectively, has no comparative advantage in 1993. In other words, if a product groups are neither price nor quality competitive they have no comparative advantage. The calculations show that there are no significant changes in distribution of trade types in the Balassa (B) indices between 1993 and 2003.

Table 6 Comparative advantage and trade types in Hungary, 1993 and 2003

	B		1993					2003		
GP	0	a	b	c	d	0	A	b	C	D
0	0.89	0.05	0.02	0.00	0.05	0.90	0.05	0.00	0.01	0.04
1	0.00	**0.44**	0.16	0.11	**0.29**	0.00	0.41	0.20	0.14	0.25
2	0.00	0.95	0.05	0.00	0.00	0.00	1.00	0.00	0.00	0.00
3	0.00	**0.42**	0.24	0.09	**0.24**	0.00	0.43	0.14	0.14	0.29
4	0.00	0.95	0.05	0.00	0.00	0.00	0.97	0.03	0.00	0.00

Note: GP trade types' categories 0 (one-way trade), 1 (successful price competition), 2 (unsuccessful price competition, 3 (successful quality competition), and 4 (unsuccessful quality competition). The B index classes: 0 (B=0), a ($0<B\leq 1$), b ($1<B\leq 2$), c ($2<B\leq 4$), and d ($4<B$).

Source: Own calculation based on OECD database.

Table 7 shows rather different picture for Slovenia. The share of product groups with successful price competitiveness in product groups of strong comparative advantage is 38 per cent in 1993 and 48 per cent in 2003, respectively. The 43 and 44 percent product groups with successful quality competitiveness have strong comparative advantage in Slovenia in 1993 and 2003. The share of product groups with successful price competition having no comparative advantage decreased from 31 per cent to 14 per cent between 1993 and 2003. The 21 per cent of successful quality competitiveness has no comparative advantage in 1993 and its share falls to 11 per cent in 2003. But, the share of unsuccessful price and quality competitiveness with no comparative advantage varies between 79 and 91 percent during analyzed period. In short, our calculations produce more consistent results for Slovenia when we compare the competitiveness and

comparative advantage, than for Hungary and we have similar picture comparing the unsuccessful competitiveness with comparative disadvantage.

Table 7 Comparative advantage and trade types in Slovenia, 1993 and 2003

	B	1993					2003			
GP	0	a	b	c	d	0	A	b	C	d
0	0.98	0.02	0.00	0.00	0.00	0.98	0.01	0.00	0.01	0.00
1	0.00	0.31	0.19	0.13	0.38	0.00	0.14	0.24	0.14	0.48
2	0.00	0.91	0.03	0.03	0.03	0.00	0.89	0.03	0.09	0.00
3	0.00	0.21	0.21	0.14	0.43	0.00	0.11	0.00	0.44	0.44
4	0.00	0.79	0.12	0.07	0.02	0.00	0.88	0.07	0.02	0.02

Note: GP trade types' categories 0 (one-way trade), 1 (successful price competition), 2 (unsuccessful price competition, 3 (successful quality competition), and 4 (unsuccessful quality competition). The B index classes: 0 (B=0), a ($0<B\leq 1$), b ($1<B\leq 2$), c ($2<B\leq 4$), and d ($4<B$).

Source: Own calculation based on OECD database.

4. CONCLUSIONS AND POLICY IMPLICATIONS

Comparative export advantages, trade types and competitiveness of Hungarian and Slovenian agro-food trade with the EU3 markets have been investigated. The Balassa's index confirmed comparative export disadvantage for Hungarian and Slovenian agro-food exports to the EU3 markets, which further deteriorate over time. Whereas the relative significance of the products with comparative export advantage in agro-food products on the EU3 markets is greater for Hungary than for Slovenia, less than 40 percent of Hungarian agro-food exports are with the comparative export advantages. Both Hungary and Slovenia have lost comparative advantage for a number of product groups and the extent of trade specialization tends to decline over time. For particular product groups, the classified Balassa indices of comparative export advantages display greater variation. They are stable for product groups with comparative export disadvantage, but product groups with weak to strong comparative export advantage show significant variation.

The price competition, quality competition and the one-way trade are analyzed using extended [1] approach. In Hungarian matched two-way agro-food trade the prevalence is on successful price competition and on successful non-price or quality competition suggesting comparative advantages for Hungarian agro-food products vis-à-vis EU3 bilateral trading partners. In Slovenian matched two-way agro-food trade the prevalence is on the unsuccessful price competition and on the unsuccessful quality competition suggesting comparative trade disadvantages vis-à-vis EU3 bilateral trading partners. Trade types for Slovenia indicate deterioration in already low degree of successful price and successful quality competition.

The probability to stay the one-way trade is relatively high for Hungary and for Slovenia, but this does not hold for the two-way matched price and quality competition categories. Only Hungary experienced greater probability to stay within successful price competition than unsuccessful price competition, and vice versa for Slovenia. The probability to stay in successful quality competition for Hungary and for Slovenia is lower than to stay in unsuccessful quality competition. We have also identified several switches between the trade type categories. Among the most striking is the shift for Slovenia from successful quality competition to the one-way trade and unsuccessful price competition. Finally, consistency tests show that these measures produce more consistent results in the comparison of unsuccessful (price and quality) competition and

comparative disadvantage. More generally, our results confirm that comparative advantage and competitiveness are not the same measure, and consequently research on comparative advantage should be interpreted with care in terms of competitiveness.

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