# Hungarian and Slovenian Agro-Food Trade with Three Main European Union Partners

*Štefan BOJNEC\* – Imre FERTŐ\*\**

## Abstract

*The paper investigates revealed comparative advantages and competitiveness of Hungarian and Slovenian agro-food trade in the three main European Union markets between 1993 and 2003. The Balassa index indicates that both countries have lost comparative advantage for a number of product groups over time. Results show that in Hungarian two-way agro-food trade the prevalence is on successful price competition and on successful quality competition. In Slovenian two-way agro-food trade the prevalence is on unsuccessful price competition and unsuccessful quality competition. The tests for consistency associations between revealed comparative advantages and competitiveness measures confirm similarities and differences in the results.*

**Keywords:** *revealed comparative advantage, competition, agro-food trade*

**JEL Classification:** F14, F23, L66, Q17, 052

## 1. Introduction

Limited research is available to investigate revealed comparative advantages for agro-food trade in Central and Eastern European (CEE) countries (Bojnec, 2001; Fertő and Hubbard, 2003). 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 states, 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

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\* Štefan  BOJNEC, University of Primorska, Faculty of Management Koper, Cankarjeva 5, SI-6104  Koper p.p. 345, Slovenia; e-mail: stefan.bojnec@fm-kp.si

\*\* Imre  FERTŐ, Institute of Economics, Hungarian Academy of Sciences, Budaörsi u. 45, H-1112  Budapest, Hungary; e-mail: ferto@econ.core.hu

trade flows, there is limited evidence on the magnitude and patterns in revealed comparative advantages and trade types potentially caused by these processes. Therefore, the aim of this paper is to investigate the revealed comparative advantages, magnitude and dynamics of trade types in agro-food trade between the selected two new EU member states (Hungary and Slovenia, respectively) and their main trading EU-15 member states (Austria, Germany and Italy, respectively). Those three markets are main outlets in agro-food trade with the EU-15 for both countries, for Hungary in both directions and for Slovenia much more substantially in agro-food imports.

The paper investigates revealed comparative advantage and competitiveness of Hungarian and Slovenian agro-food trade in the selected EU-3 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 revealed comparative advantage of the Hungarian and Slovenian agro-food trade in the EU-3 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 of revealed comparative advantage. Second, we apply the extended Gehlhar and Pick's (2002) approach to assess the competitiveness of Hungarian and Slovenian agro-food trade in the EU-3 markets.

The structure of the paper is organized as follows. In the second section we present conceptual issues of competitiveness and revealed comparative advantages and explain methodology. In the third section there are described data used and presented empirical results in two steps. First, we analyze the revealed comparative advantages. 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 Gehlhar and Pick's (2002) procedure to investigate successful price and successful non-price competition categories in the matched two-way trade flows. The final section concludes.

## 2. Conceptual 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. 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, Kennedy et al. (1997, 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) at national or macroeconomic level; (ii) at industry or mesoeconomic level; and (iii) at firm or 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. Porter, 1990; Krugman, 1994).

Competitiveness of nations 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. Barkema et al. (1991) emphasized the role of distortion in agricultural markets and thus asserted that competitiveness takes a more realistic view about the world. Lafay (1992) sheds light on two additional differences between revealed comparative advantage and competitiveness. First, competitiveness usually involves a cross-country comparison for a particular product, whilst revealed comparative advantage is measured between products within a country. Second, competitiveness is subject to changes in macroeconomic variables, whereas revealed comparative advantage is structural in nature. Thus empirical analyses that focus on revealed comparative advantage and competitiveness may lead different results. For example, Fertő and Hubbard (2003) provide evidence that results focusing on both competitiveness and revealed comparative advantage produce different results for Hungarian agriculture.

Both revealed comparative advantage and competitiveness are based on the concept of general equilibrium. McCorriston and Sheldon (1994) 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, McCorriston and Sheldon (1994), and Aiginger (1998) 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.

Our focus in this paper is on competitiveness and revealed comparative advantages at the industry or mesoeconomic level. The ability to compete in international and domestic markets depends on price competitiveness and/or product quality in two-way matched trade flows or on some other factors that are important for one-way trade. Unit export – import values approach and trade balance allows us to investigate the price and quality competitiveness of the Hungarian and Slovenian agro-food sector. In addition, employing trade data this can contribute to a better understanding of the evolution in the revealed comparative advantage of both countries' agriculture and the food sector.

### 2.2. Methodology

The nature of revealed comparative advantage and competitiveness in trade are the main methodological approaches that are applied in this paper. The concept of 'revealed' comparative advantage, introduced by Liesner (1958) but refined and popularized by Balassa (1965) and therefore known as the 'Balassa index', is widely used empirically to identify a country's weak and strong export sectors. Porter (1990) uses it to identify strong sectoral clusters, Amiti (1998) analyses specialization patterns in Europe, Proudman and Redding (2000), and Redding (2002) focus on the dynamics of comparative advantage, Bojnec (2001) analyses agricultural trade, Hinloopen and van Marrewijk (2001; 2004) study the (dynamics of the) empirical distribution of European and Chinese trade, and Fertő and Hubbard (2003) analyze competitiveness in Hungarian agro-food sectors.

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

$$B = (Xij / Xrj) / (Xis / Xrs) \qquad (1)$$

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 or Slovenian agro-food exports for a particular product group to EU-3 countries (Austria, Germany and Italy), while $X_{is}$ is total merchandise exports of Hungary or Slovenia, respectively, to EU-3; $X_{rj}$ denotes the EU-3's agro-food exports for a given product and $X_{rs}$ total merchandise exports by EU-3 countries, which are used as the benchmark market of comparison. Our investigations are focused on the size and patterns of the B trade indices over time.

There is no accepted guide in the literature for classification of B-index into appropriate categories. Most studies classify data into various per centiles, like quartiles or quintiles. Hinloopen and van Marrewijk (2001) point out that such 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 Hinloopen and van Marrewijk (2001), we divide the B-index into four classes:

Class *a*: 0 < B ≤ 1;
Class *b*: 1 < B ≤ 2;
Class *c*: 2 < B ≤ 4;
Class *d*: 4 < B.

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

Besides the nature of revealed comparative advantage, we also employ the methodological approach that distinguishes between price and quality competition 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 competition and product quality in two-way matched trade data (e.g. Stiglitz, 1987; Abd-el--Rahman, 1991; Aiginger, 1997; Ulff and Nielsen, 2000). Gehlhar and Pick (GP) (2002) 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 $X_{(i,j)} > M_{(i,j)}$) and $UVD_{(i,j)} < 0$ (or $UV^x_{(i,j)} < UV^m_{(i,j)}$)

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

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

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

where the trade balance ($TB_{(i,j)}$) is calculated as $TB_{(i,j)} = X_{(i,j)} - M_{(i,j)}$ where $X_{(i,j)}$ is the value of the *i*-th product exports from a home (domestic) country to the *j*-th partner country and $M_{(i,j)}$ 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 $UV^x_{(i,j)} = X_{(i,j)}/Q^x_{(i,j)}$ and $UV^m_{(i,j)}$ is the import unit value, which is calculated as $UV^m_{(i,j)} = M_{(i,j)}/Q^m_{(i,j)}$. 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 quality 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 on one side or deficit, which consists only from imports on the other. 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 $X_{(i,j)} > 0$, $M_{(i,j)}=0$) and $UV^m_{(i,j)} = 0$

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

The Gehlhar and Pick's (2002) 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 quality competition, respectively, and vice versa in the second and fourth categories where the home country is unsuccessful in price and quality competition. Finally, we also conducted consistency tests as a cardinal measure between revealed comparative advantage and competitiveness categories. The consistency test is based on the simple calculation of relative frequency between pairs of the B-index of classes of revealed comparative advantages and the extended GP trade and competition types' categories.

## 3. Data and Empirical Results

To conduct the empirical analysis on revealed comparative advantages, trade types and competitiveness in the bilateral Hungarian and Slovenian agro-food

trade, respectively, with the EU-3 partners' countries (Austria, Germany and Italy), we use detailed trade data from OECD by the years 1993 – 2003. Agro--food trade is defined by EU-Commission (1999). List of product groups at the two-digit Standard International Trade Classification (SITC) system is presented in Table A1 in Appendix. The sample consists of 255 items at the four-digit SITC level. It is worth mentioning that the share of the analyzed EU-3 countries in Hungarian and Slovenian agro-food trade with the EU-15 countries is on average 67 and 87 per cent, respectively during the analysed period, where Hungary is net exporter and Slovenia net importer of agro-food products from the EU-3 countries as well as with the EU-15.

### 3.1. Revealed Comparative Advantages

Revealed 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 EU-3 markets. As can be seen from Figure 1, neither Hungary nor Slovenia enjoyed revealed comparative advantage in agro-food exports to the EU-3 markets. The median value of the B-index less than 0.8 clearly indicates revealed comparative disadvantage. The value of the B-index tends to deteriorate over time indicating the deterioration of revealed comparative advantages. Secondly, by the country's (Hungary or Slovenia) proportion of agro-food products with the revealed comparative advantages (B > 1) in its total agro-food exports to the EU-3 markets.

F i g u r e  1

**Median of the B-index and the Share of Product Groups B > 1 for Hungary and Slovenia**
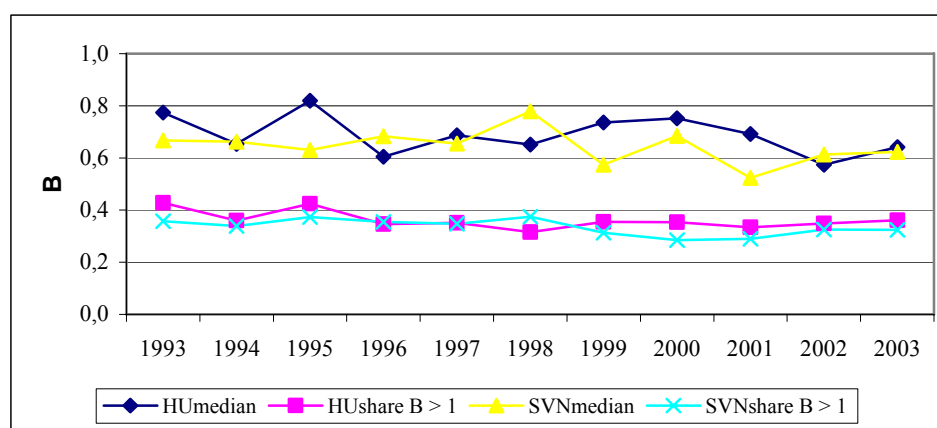


B – Balassa's (1965) index of revealed comparative advantage.

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 per cent. The latter indicates that less than 40 per cent of agro-food exports from Hungary and a bit less from Slovenia to the EU-3 markets can be included in the group with the revealed comparative advantages, and vice versa, more than 60 per cent of Hungarian or even more for Slovenian agro-food exports to the EU-3 markets there is found revealed comparative disadvantage suggesting difficulties exporting successfully agro-food products to the EU-3 markets.

### 3.2. Trade Types and Competitiveness

When simultaneously comparing trade balance by a product as a proxy for successful competition in trade and unit export – import 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 EU-3 countries increased between 1993 and 1997, but declined and stabilized after then at around 16 per cent (Table 1). 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 EU-3 countries. On the other hand relatively high increase in the degree of the matched two-way agro--food trade in 1998 suggests a response to 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 EU-3 countries as a whole 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 symmetrically distributed between exports and imports, but Hungary experienced (similar to

Slovenia) 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. The patterns in these two competition categories over time are crucial for Hungarian bilateral two-way trade.

T a b l e 1
**Classifying Trade Flows and Competition Categories in Two-way Matched Trade**

|  | 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 trade | 0.24 | 0.31 | 0.31 | 0.26 | 0.30 | 0.20 | 0.32 | 0.32 | 0.27 | 0.26 | 0.22 |
| Exports | 0.08 | 0.03 | 0.06 | 0.06 | 0.09 | 0.12 | 0.11 | 0.11 | 0.07 | 0.08 | 0.13 |
| Imports | 0.92 | 0.97 | 0.94 | 0.94 | 0.91 | 0.88 | 0.89 | 0.89 | 0.93 | 0.92 | 0.87 |
| Two-way trade | 0.76 | 0.69 | 0.69 | 0.74 | 0.70 | 0.80 | 0.68 | 0.68 | 0.73 | 0.74 | 0.78 |
| Category 1 | 0.32 | 0.33 | 0.29 | 0.27 | 0.30 | 0.27 | 0.31 | 0.30 | 0.27 | 0.28 | 0.25 |
| Category 2 | 0.33 | 0.26 | 0.34 | 0.39 | 0.35 | 0.38 | 0.36 | 0.38 | 0.39 | 0.38 | 0.40 |
| Category 3 | 0.10 | 0.08 | 0.09 | 0.08 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.09 |
| Category 4 | 0.24 | 0.34 | 0.28 | 0.27 | 0.29 | 0.30 | 0.28 | 0.27 | 0.29 | 0.28 | 0.26 |
| Slovenia – total |  |  |  |  |  |  |  |  |  |  |  |
| One-way trade | 0.13 | 0.17 | 0.19 | 0.14 | 0.16 | 0.10 | 0.12 | 0.20 | 0.18 | 0.14 | 0.14 |
| Exports | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Imports | 1.00 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Two-way trade | 0.87 | 0.83 | 0.81 | 0.86 | 0.84 | 0.90 | 0.88 | 0.80 | 0.82 | 0.86 | 0.86 |
| Category 1 | 0.28 | 0.26 | 0.18 | 0.20 | 0.22 | 0.19 | 0.19 | 0.27 | 0.25 | 0.24 | 0.22 |
| Category 2 | 0.34 | 0.31 | 0.40 | 0.39 | 0.38 | 0.43 | 0.26 | 0.37 | 0.37 | 0.45 | 0.38 |
| Category 3 | 0.15 | 0.08 | 0.12 | 0.08 | 0.07 | 0.10 | 0.09 | 0.06 | 0.04 | 0.06 | 0.11 |
| Category 4 | 0.23 | 0.36 | 0.30 | 0.34 | 0.33 | 0.28 | 0.46 | 0.30 | 0.34 | 0.25 | 0.29 |

*Note*: Bilateral trade is simple sum up of trade with EU-3 countries (Austria, Germany and Italy).
*Source*: Own calculation based on OECD database.

The Slovenian one-way bilateral agro-food trade with the individual EU-3 countries is more stable, at lower levels and degrees. Unlike for Hungary, the one-way agro-food import flows for Slovenia are far the most important. Within the two-way matched bilateral agro-food 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. These results for the Slovenian agro-food sector clearly indicate a lack of price and quality competition with the EU-3 markets.

Similar as for Hungary, the relative importance of the one-way trade is less important in total Slovenian agro-food trade with the EU-3 countries than in bilateral trade flows with the individual EU-3 countries. This is expected result consistent with trade data aggregation. Almost all Slovenian one-way agro-food trade flows with the EU-3 countries 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 EU-3 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 competition types for Slovenia indicate deterioration in already low degree of successful price and successful quality competition.

### 3.3. Consistency Tests for Revealed Comparative Advantages, Trade Types and Competitiveness

We may hypothesize that the products which have strong revealed comparative advantage they are also competitive in terms of successful price or quality competition and vice versa. Similarly product groups with revealed comparative disadvantage probably they do not have neither successful price nor successful quality competition. The consistency test based on the calculation of relative frequency between pairs of the B-index and extended GP trade type categories are conducted. The results show that 29 per cent of product groups with successful price competition and 24 per cent of product groups with successful quality competition, respectively, have strong revealed comparative advantage in Hungarian agro-food trade with the EU-3 in 2003 (Table 2). The row for the category 1 shows that 44 per cent of successful price competition has no revealed comparative advantage and the row for the category 3 displays that 42 per cent of successful quality competition has no revealed comparative advantage in Hungarian agro-food trade with the EU-3 in 1993. But, noteworthy it is important to notice that 95 per cent of unsuccessful price and unsuccessful quality competition,

respectively, has no revealed comparative advantage in Hungarian agro-food trade with the EU-3 in 1993. In other words, if a product group is neither price nor quality competitive it has no revealed comparative advantage. The calculations show that there are no significant changes in distribution of competition trade types and the Balassa (B) indices of revealed comparative advantages between 1993 and 2003.

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**Revealed Comparative Advantage (B) and GP Trade Types in Hungary, 1993 and 2003**

| | | B | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1993 | | | | | 2003 | | | | |
| | | *0* | *a* | *b* | *c* | *d* | *0* | *a* | *b* | *c* | *d* |
| GP | *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.

T a b l e   3

**Revealed Comparative Advantage (B) and GP Trade Types in Slovenia, 1993 and 2003**

| | | B | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1993 | | | | | 2003 | | | | |
| | | *0* | *a* | *b* | *c* | *d* | *0* | *a* | *b* | *c* | *d* |
| GP | *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.

Table 3 shows rather different picture for Slovenia. The share of product groups with successful price competition in product groups of strong revealed comparative advantage is 38 per cent in 1993 and 48 per cent in 2003, respectively. The 43 and 44 per cent product groups with successful quality competition have strong revealed comparative advantage in Slovenian agro-food trade with the EU-3 in 1993 and 2003. The share of product groups with successful

price competition having no revealed comparative advantage decreased from 31 per cent to 14 per cent between 1993 and 2003. The 21 per cent of successful quality competition has no revealed comparative advantage in 1993 and its share falls to 11 per cent in 2003. But, the share of unsuccessful price and unsuccessful quality competitions with no revealed comparative advantage varies between 79 and 91 per cent during the analyzed period. In short, our calculations produce more consistent results for Slovenia when we compare the successful competition and revealed comparative advantage, than for Hungary and we have similar picture comparing the unsuccessful competition with revealed comparative disadvantage.

## Conclusions

Revealed comparative advantages, competition trade categories and one-way competitiveness of Hungarian and Slovenian agro-food trade with the EU-3 markets have been investigated. The Balassa's index confirmed revealed comparative disadvantage for Hungarian and for majority of Slovenian agro-food exports to the EU-3 markets, which further deteriorate over time. Whereas the relative significance of the products with revealed comparative advantage in agro-food products on the EU-3 markets is greater for Hungary than for Slovenia, even for Hungary less than 40 per cent of Hungarian agro-food exports are with the revealed comparative advantages. Both Hungary and Slovenia have lost revealed 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 revealed comparative advantages display greater variation. They are stable for product groups with revealed 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 Gehlhar and Pick's (2002) approach. In Hungarian matched two-way agro-food trade the prevalence is on successful price competition and on successful quality competition suggesting comparative advantages for Hungarian agro-food products vis-à-vis EU-3 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 EU-3 bilateral trading partners. Trade types for Slovenia indicate deterioration in already low degree of successful price and successful quality competition.

Finally, the consistency tests between revealed comparative advantages and trade types, including competition categories in two-way matched trade show

more consistent results in the comparison of unsuccessful (price and quality) competition and revealed comparative disadvantage. More generally, our results confirm that revealed comparative advantage, competition trade types in matched two-way trade and one-way competitiveness are not necessary the same measure, and consequently research on revealed comparative advantage should be interpreted with care in terms of competitiveness.

# A p p e n d i x

T a b l e A1

**List of Product Groups in Two-digit SITC Level**

| Two-digit SITC Product Code | Name of Product |
|---|---|
| 00 | Live animals other than animals of division 03 |
| 01 | Meat and meat preparations |
| 02 | Dairy products and birds' eggs |
| 03 | Fish, crustaceans, molluscs and preparations thereof |
| 04 | Cereals and cereal preparations |
| 05 | Vegetables and fruits |
| 06 | Sugar, sugar preparations and honey |
| 07 | Coffee, tea, cocoa, spices, and manufactures thereof |
| 08 | Feedstuff for animals (excluding unmilled cereals |
| 09 | Miscellaneous edible products and preparations |
| 11 | Beverages |
| 12 | Tobacco and tobacco manufactures |
| 21 | Hides, skins and furskins, raw |
| 22 | Oil seeds and oleaginous fruits |
| 23 | Crude rubber (including synthetic and reclaimed) |
| 24 | Cork and wood |
| 26 | Textiles fibres and their wastes |
| 29 | Crude animal and vegetable materials, n.e.s |
| 41 | Animal oils and fats |
| 42 | Fixed vegetable oils and fats, crude, refined or fractionated |
| 43 | Processed animal and vegetable oils and fats |
| 59211/59212 | Wheat/maize starch |

# References

[1] ABD-EL-RAHMAN, K. (1991): Firms' Competitive and National Comparative Advantages as Joint Determinants of Trade Composition. Weltwirtschaftliches Archiv, *127*, No. 1, pp. 83 – 97.
[2] AIGINGER, K. (1997): The Use of Unit Values to Discriminate between Price and Quality Competition. Cambridge Journal of Economics, *21*, pp. 571 – 592.
[3] AIGINGER, K. (1998): A Framework for Evaluating the Dynamic Competitiveness of Countries. Structural Change and Economic Dynamics, *9*, pp. 159 – 188.
[4] AMITI, M. (1998): New Trade Theories and Industrial Location in the EU. Oxford Review of Economic Policy, *14*, No. 2, pp. 45 – 53.

[5] BALASSA, B. (1965): Trade Liberalization and Revealed Comparative Advantage. The Manchester School of Economic and Social Studies, *33*, No. 1, pp. 99 – 123.

[6] BARKEMA, A. – DRABENSTOTT, M. – TWEETEN, L. (1991): The Competitiveness of U.S. Agriculture in the 1990s in Agricultural Policies. In: ALLEN, K. (ed.): The 1990s in Agricultural Policies in the New Decade. Resources for the Future. Washington, DC: National Planning Association.

[7] BOJNEC, S. (2001): Trade and Revealed Comparative Advantage Measures: Regional and Central European Agricultural Trade. Eastern European Economics, *39*, No. 2, pp. 72 – 98.

[8] EU-Commission (1999): The Agricultural Situation in the European Community 1998. [Report.] Brussels: European Commission.

[9] FERTŐ, I – HUBBARD, L. J. (2003): Revealed Comparative Advantage and Competitiveness in Hungarian Agri-Food Sectors. The World Economy, *26*, No. 2, pp. 247 – 259.

[10] GEHLHAR, M. J. – PICK, D. H. (2002): Food Trade Balances and Unit Values: What Can they Reveal about Price Competition? Agribusiness, *18,* pp. 61 – 79.

[11] HINLOOPEN, J. – van MARREWIJK, C. (2001): On the Empirical Distribution of the Balassa Index. Weltwirtschaftliches Archiv, *137*, No. 1, pp. 1 – 35.

[12] HINLOOPEN, J. – van MARREWIJK, C. (2004): Dynamics of Chinese Comparative Advantage. [Working Paper, 2004-034/2.] Amsterdam: Tinbergen Institute.

[13] KENNEDY, P. L. – HARRISON, R. W. – KALAITZANDONAKES, N. G. – PETERSON, H. C. – RINDFUSS, R. P. (1997): Perspectives on Evaluating Competitiveness in Agribusiness Industries. Agribusiness, *13*, pp. 385 – 392.

[14] KRUGMAN, P. (1994): Competitiveness: a Dangerous Obsession. Foreign Affairs, *73*, No. 2, pp. 28 – 44.

[15] LAFAY, G. (1992): The Measurement of Revealed Comparative Advantages. In: DAGENAIS, M. G. and PLUNET, P. A. (eds.): International Trade Modelling. London: Chapman & Hall, pp. 209 – 236.

[16] LIESNER, H. H. (1958): The European Common Market and British Industry. Economic Journal, *68*, pp. 302 – 316.

[17] McCORRISTON, S. – SHELDON, I. M. (1994): International Competitiveness: Implications New International Economics. In: BREDAHL, M. E., ABBOTT, P. C. and REED, M. (eds.): Competitiveness in International Food Markets. Boulder: Westview Press, pp. 129 – 143.

[18] PORTER, M. (1990): The Competitive Advantage of Nations. London: MacMillan.

[19] PROUDMAN, J. – REDDING, S. (2000): Evolving Patterns of International Trade. Review of International Economics, *8*, pp. 373 – 396.

[20] REDDING, S. (2002): Specialization Dynamics. Journal of International Economics, *58*, No. 2, pp. 299 – 334.

[21] STIGLITZ, J. E. (1987): The Causes and Consequences of the Dependence of Quality on Prices. Journal of Economic Literature, *25*, No. 1, pp. 1 – 48.

[22] ULFF, J. – NIELSEN, M. (2000): Price-Quality Competition in the Exports of the Central and Eastern European Countries. Intereconomics, March/April, pp. 94 – 101.