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Export competitiveness of the European Union in fruit and vegetable products in the global markets

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Abstract: The research provides evidence on the fruit and vegetable products export competitiveness of the European Union (EU-27) member states in the global markets. The revealed comparative advantage index is used to analyse the levels and compositions in the export competitiveness by differentiated fruit and vegetable products. Most of the EU-27 member states experienced revealed comparative disadvantages in the fruit and vegetable products in the global markets. Spain and the Netherlands experienced the most robust results of the revealed comparative advantages between 2000 and 2011 and among fruit and vegetable groups of products. Most other of the EU-27 member states with the comparative export advantages in fruit and vegetable products specialized in a certain segment or niche fruit and vegetable products.

Keywords: fruit and vegetable, mobility indices, revealed comparative advantage, survival analysis,

This paper aims to provide the empirical evidence on better understanding of the European Union (EU-27) fruit and vegetable product export competitiveness in the global markets. The EU-27 member states play a substantial role in the global fruit and vegetable product markets (FAO 2013). So far there is only a rare study to address the export competitiveness and its duration during the rapid changes in global fruit and vegetable product markets (Asciuto et al. 2008; Bojnec and Fertő 2015b).

During the most recent decade of economic and financial crisis, the horticultural sector has been exposed to substantial structural changes in the food supply and changing trends in the nutrition demand (Crescimanno et al. 2014). In the global fruit and vegetable product markets, there are present fewer and larger horticultural growers. There is an increasing role of supermarkets with the concentration of the retail pathways in the developed and developing countries (Ruben et al. 2007; Dehnen-Schmutz et al. 2010). The changing complexity of the national and global fruit and vegetable chain structures might have possible impacts on the fruit and vegetable product export competitiveness, which is of increasing business and policy concerns for the sustainable fruit and vegetable sector development (Sansavini 1997).

The paper contributes new knowledge on the fruit and vegetable product export competitiveness in the global markets and its long-term duration. It provides evidence on the export competitiveness by the main fruit and vegetable product categories. The paper tests a hypothesis regarding the duration and probability of the long-term survival of the continuing export competitiveness. On the basis of the empirical evidence on the fruit and vegetables product export competitiveness, there are derived implications of the importance for commercial fruit and vegetable product chain management.

MATERIAL AND METHODS

The use of descriptive indicators to analyse competitiveness has been extensive in the literature (e.g. Latruffe 2010). The nature of the revealed comparative advantage (RCA) indices for the fruit and vegetable products is investigated employing the methodological approach, which is widely used in the empirical trade literature to identify a country's weak and strong export sectors. The RCA index is defined as follows (Balassa 1965):

$$RCA = (Xij/Xim)/(Xwj/Xwm) \quad (1)$$

where X represents exports, i is a country, j is a commodity, m is a set of commodities, and w is a set of countries. The RCA index is based on the observed

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trade patterns. *Xij* describes the individual EU-27 countries *i* exports for the particular fruit and vegetable product group *j* to the global market, while *Xim* is the total merchandise exports of the individual EU-27 countries *i* to the global markets. *Xwj* denotes the global exports for the given fruit and vegetable product *j* and *Xwm* the total global merchandise exports, which are used as the benchmark of comparison. The EU-27 member states fruit and vegetable product export competitiveness is investigated in the global market as the benchmark of comparison, because the share of the intra-EU-27 member states export for the fruit and vegetable products is more than 80% in the total (intra and extra) EU-27 member states export for the fruit and vegetable products. If the RCA > 1, then the country's fruit and vegetable product comparative advantage in the global market is revealed, i.e. a fruit and vegetable product group in which the country is relatively more specialized in the terms of exports.

Despite some critiques of the RCA index as an export specialization index, such as the asymmetric value problem and the problem with the logarithmic transformation (De Benedictis and Tamberi 2004), the importance of the simultaneous consideration of the import side (Vollrath 1991), and the lack of a sound theoretical background, which is provided by Costinot et al. (2012) and Leromain and Orefice (2013) – the RCA index remains a popular tool for analysing the export competitiveness in the empirical trade literature.

The stability of the value of the RCA indices in the global markets for the particular fruit and vegetable product groups is investigated in two steps. First, the Markov chain model is a common way of estimating the intra-distribution dynamics and the structural stability of the trade specialization indices over time. The methods of evaluating the intra-distribution dynamics was originally proposed by Quah (1993, 1997) for the analysis of cross-country income convergence. Fruit and vegetable products are classified into two categories: fruit and vegetable products with the revealed comparative disadvantage (RCA < 1), and fruit and vegetable products with the revealed comparative advantage (RCA > 1). The transition probabilities for the RCA index can be estimated by counting the number of transitions out of and into each cell with continues RCA > 1 index. The interpretation of persistence or mobility throughout the entire distribution of the RCA index can be easily studied by using the Markov transition probability matrix. The high values of the Markov transition probability matrix along the diagonal suggest a high persistence in the RCA > 1 (RCA < 1) index, whilst high values for the off-diagonal elements imply a high mobility ins and outs in the RCA > 1 index.

Second, the degree of mobility in patterns of the revealed comparative advantage can be summarized by using the index of mobility; this formally evaluates the degree of mobility throughout the entire distribution of the RCA indices and facilitates the direct cross-country comparisons. The mobility index, M_1, following Shorrocks (1978), evaluates the trace (tr) of the Markov transition probability matrix. This M_1 index thus directly captures the relative magnitude of the diagonal and off-diagonal terms, and it can be shown to equal the inverse of the harmonic mean of the expected duration of remaining in the given class:

$$M_1 = \frac{K - tr(P)}{K - 1} \tag{2}$$

where *K* is the number of classes, and P is the Markov transition probability matrix. A higher value of the M_1 index indicates a greater mobility (the upper limit is two in this case), with the value of zero indicating the perfect immobility.

Following the recent empirical trade literature (e.g. Besedeš and Prusa 2006a, 2006b; Bojnec and Fertő 2008, 2012b, 2014a, 2014b, 2015a) in the next step we examine the duration of the revealed comparative advantage. Calculating the duration then appears to be straightforward: it is simply the time (measured in years) that the product has maintained the revealed comparative advantage (RCA > 1) without any interruption. Alternatively, applying statistical techniques from the survival analysis, the duration can be modelled as a sequence of the conditional probabilities that the product's revealed comparative advantage (RCA > 1) continues after *t* periods, given that it has already survived for *t* periods. Specifically, let *T* be a random variable that denotes the length of a spell with the uninterrupted RCA > 1. Then, in discrete time, the survival function, S(T), is defined as:

$$S(T) = \Pr(T \geq t). \tag{3}$$

In empirical studies, the survival functions are estimated (in a non-parametric way) by computing the number of spells that survive (end) as a fraction of the total number of spells that are at risk after *t* periods. More specifically, the duration of the revealed comparative advantage (RCA > 1) for the fruit and vegetable products for each of the EU-27 countries is estimated applying the nonparametric Kaplan-Meier

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product limit estimator (Cleves et al. 2004). The Kaplan-Meier estimator of the hazard function is the fraction of spells that fail after t periods of all spells that have survived t periods. The survivor function is the share of spells that survives at time t, but this time is cumulative of all preceding time intervals. That is, if all spells survive and the ratio is one, the survivor function is flat at this interval; otherwise, the function is stepwise declining.

Formally, the Kaplan-Meier estimator of the survival function is:

$$\hat{S}(t) = \prod_{t(i)<t} \frac{n_j - d_j}{n_j}, \quad (4)$$

where n_j denotes the number of subjects at risk of failing at $t(_j)$, and d_j denotes the number of the observed failures. Given that many observations are censored, it is then noted that the Kaplan-Meier estimator is resistant to censoring and uses information from both the censored and non-censored observations. It is possible that in some cases the revealed comparative advantages (RCA > 1) were dissolved (RCA < 1) and later re-established (RCA > 1) during the sample period. The episodes of the uninterrupted revealed comparative advantage (RCA > 1) are the primary unit of the analysis.

DATA

The empirical analysis of the RCA indices is conducted for the EU-27 member states using the detailed trade data at the six-digit World Customs Organization Harmonized System (HS-6) level by the years 2000–2011. The United Nations International Trade Statistics UN Comtrade database (UNSD 2013) is used for the Multi-Lateral Trade Negotiations (MTN) codes, which includes three main categories for the fruit and vegetable products: MTN 1201 – fruit and vegetable products fresh or dried (consisting of 87 HS-6 codes fruit and vegetable product items), MTN 1202 – fruit and vegetable products semi-processed (consisting of 11 HS-6 codes fruit and vegetable product items), and MTN 1203 – fruit and vegetable products prepared or preserved (consisting of 49 HS-6 codes fruit and vegetable items). The UNSD (2013) concordance between the HS-6 codes and the MTN systems for the fruit and vegetable products are used. The intra-EU-27 member states trade is included, and comparisons in the trade share results are made between the total (intra and extra) EU-27 member states trade for the fruit and vegetable products and the intra-EU-27 member states trade for the fruit and vegetable products.

RESULTS

Export, import and trade balance for fruit and vegetable products

Although substantial differences characterise the individual export and import performances of the EU-27 member states, they are net importers of the fruit and vegetable products (Figure 1). The import shares are higher than the export shares in the global markets. The EU-27 member states export share in the global market for fruit and vegetable products experienced a deterioration over time and represented 45.6% in 2000, 49.3% in 2003, and 39.6% in 2011. On the other hand, the import share in the global market represented 51.6% in 2000, 55.9% in 2004, and 46.3% in 2011.

Between 2000 and 2011, the decline in the EU-27 member states export share for the fruit and vegetable products in the global market has been for Spain, the Netherlands, Italy, France, Belgium, Greece, and the United Kingdom (UK) (Figure 2). A slight increase in the export share for the fruit and vegetable products in the global market has been achieved for Austria, Portugal, Poland, Lithuania, Bulgaria, the Czech Republic, Latvia and Slovenia. The other EU-27 member states have experienced relatively stable export

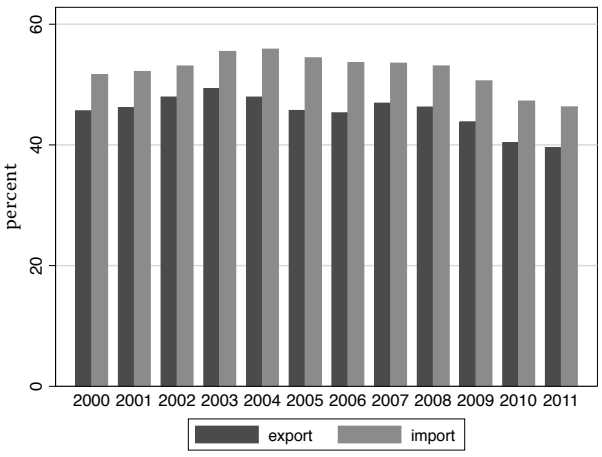

Figure 1. The EU-27 member states export and import shares in the global market for the fruit and vegetable products (in %)

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

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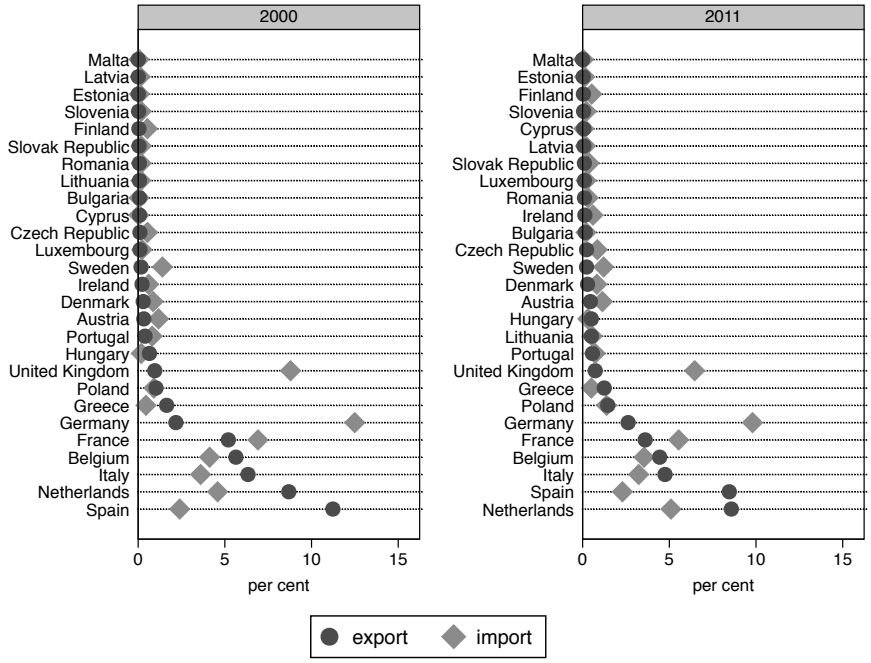

Figure 2. Export and import shares of the EU-27 member states in the global market for the fruit and vegetable products (in %)

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

shares in the global market, but at a relatively low level. A greater export shares than import shares with the trade surplus for the fruit and vegetable products in the global market are clearly confirmed particularly for the Netherlands, Spain, Italy, Belgium and Greece.

The size of the trade surplus (greater value of export than value of import) for the fruit and vegetable products in the global market is confirmed as the largest among the EU-27 member states for Spain, the Netherlands, Italy, Belgium and Greece (Figure 3). On the other hand, the size of the trade deficit (smaller value of export than value of import) for fruit and vegetable products in the global market is the largest for Germany, the UK and France.

Most of the EU-27 member states fruit and vegetable products are traded intra-EU-27 member states. The

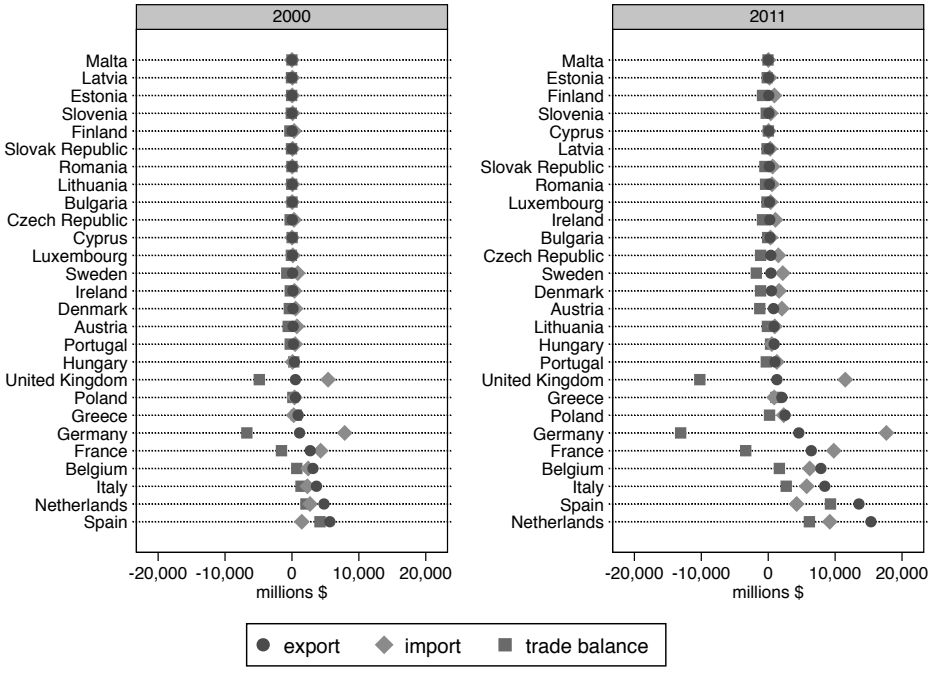

Figure 3. Values of export, import and trade balance of the EU-27 member states in the global market for the fruit and vegetable products (in millions of US dollars)

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

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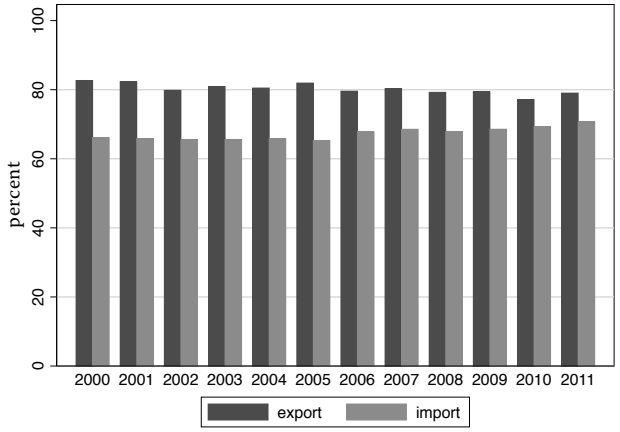

Figure 4. The intra-EU-27 member states export and import shares in the global market for the fruit and vegetable products (in %)

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

intra-EU-27 member states export of the fruit and vegetable products represented 82.7% of the total (intra and extra) EU-27 member states export of the fruit and vegetable products in 2000 and 79.0% in 2011, while the intra-EU-27 member states import 66.1% of the total (intra and extra) EU-27 member states import of the fruit and vegetable products in 2000 and 70.7% in 2011 (Figure 4). While the share of the intra-EU-27 member states export of the fruit and vegetable products tends to decline, the share of the intra-EU-27 member states import of the fruit and vegetable products has increased. The lower share of the intra-EU-27 member states import than the share of the intra-EU-27 member states export of the fruit and vegetable products suggest a greater importance of the extra-EU-27 member states import than the extra-EU-27 member states export with the negative extra-EU-27 member states trade balance for the fruit and vegetable products.

There are considerable differences among the EU-27 member states in the shares of the intra-EU-27 member states trade in the total trade (intra- and extra-EU-27) for the fruit and vegetable products (Figure 5). The share of the intra-EU-27 member states trade is greater than the share of the extra-EU-27 member states trade for the fruit and vegetable products. Except for Slovenia, Denmark and Latvia in 2000, other EU-24 member states experienced a greater share of the intra-EU-27 member states export than import. In 2011, this holds for Denmark and Latvia, while Slovenia shifted from a greater import to a greater export share in the intra-EU-27 member states trade for the fruit and vegetable products. On the other hand, Lithuania, Ireland, Estonia, Poland,

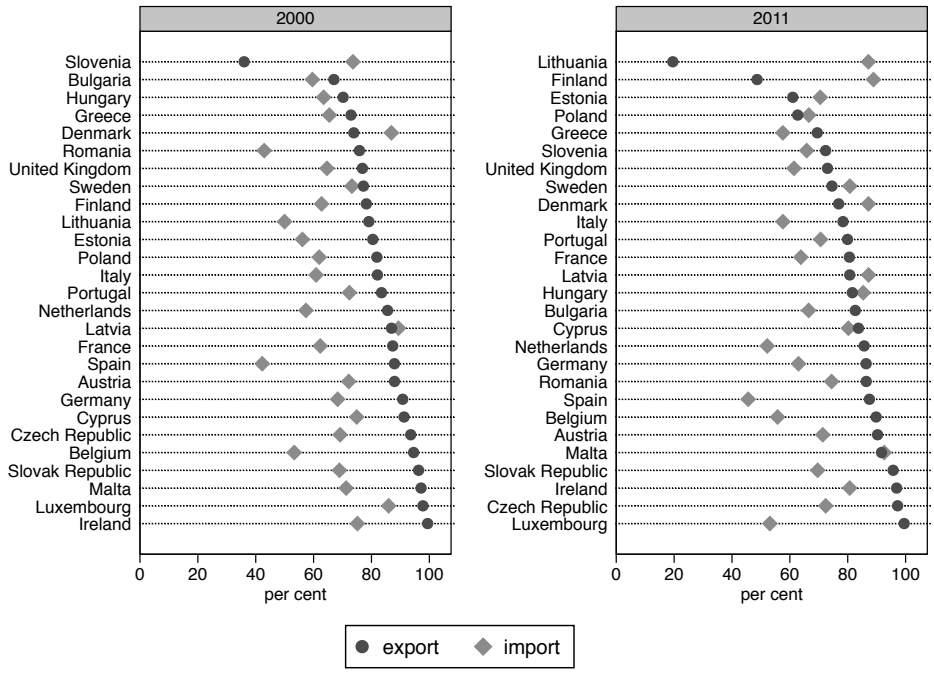

Figure 5. The intra-EU-27 member states export and import shares by countries in the global market for the fruit and vegetable products (in %)

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

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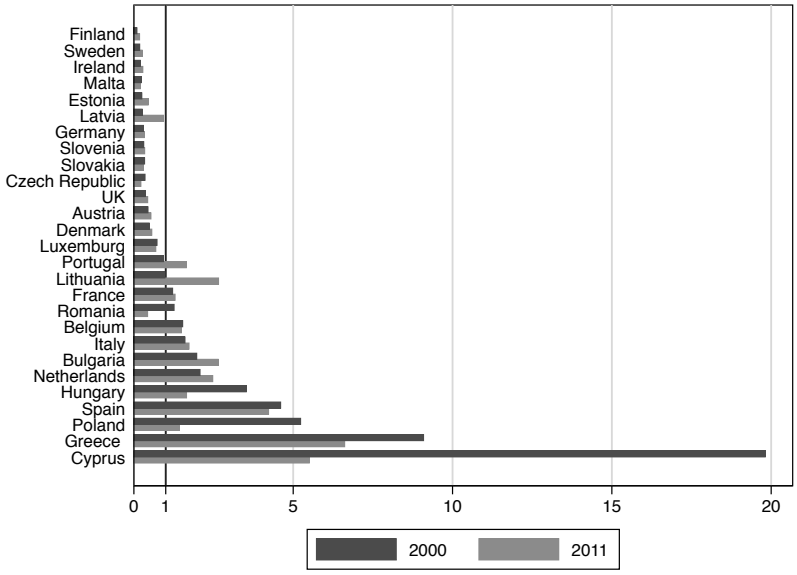

Figure 6. Revealed comparative advantage (RCA) indices for the fruit and vegetable products of the EU-27 member states, 2000–2011

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

Sweden, Hungary and Malta shifted from a greater export to a greater import share in the intra-EU-27 member states trade for the fruit and vegetable products. Most of the EU-27 member states experienced a greater export than import shares in the intra-EU-27 member states trade for the fruit and vegetable products and most of them are net importer of the fruit and vegetable products from the global markets in the extra-EU-27 member states trade for the fruit and vegetable products.

RCA indices for fruit and vegetable products

Figure 6 presents the RCA indices for the fruit and vegetable products of the EU-27 member states in the global markets in the years 2000 and 2011.[1] Eleven of the EU-27 member states experienced the RCA > 1 in the fruit and vegetable products in the global markets: Belgium, Bulgaria, Cyprus, France, Greece, Hungary, Italy, Lithuania, the Netherlands, Poland, and Spain.

Most of these countries are situated in favourable natural climatic Mediterranean and Black sea conditions (e.g. Bulgaria, Cyprus, France, Greece, Italy, and Spain) or they are exploiting some other factors such as the available cheaper labour force for the intensive horticultural production (e.g. Hungary, Poland and Lithuania) or they have developed technologies for the competitive fruit and vegetable production also in the less favourable climatic conditions (e.g. Belgium and the Netherlands).The export competitive fruit and vegetable production can be a result of the favourable natural and climatic conditions and advanced technologies, including the advanced marketing and global promotion activities. Romania has lost its export competitiveness over time. Portugal, similar as other Mediterranean EU member states, has gained the export competitiveness.

Other fourteen EU-27 member states experienced the RCA < 1 in the fruit and vegetable products in the global markets: Austria, the Czech Republic, Denmark, Estonia, Finland, Germany, Ireland, Latvia, Luxembourg, Malta, Slovakia, Slovenia, Sweden, and the UK. Some of these countries are situated in the Northern Europe or close to the Alpine part of Europe. In addition to the natural handicaps for the fruit and vegetable production, some of these countries are economically developed countries with relatively high incomes and the associated high domestic demands for the fruit and vegetable products. The domestic fruit and vegetable consumption can have a substitution effect for their exports.

RCA indices for the fruit and vegetable product groups

Nine of the EU-27 member states experienced the revealed comparative advantage (RCA > 1) in the

[1]The levels of the RCA indices for fruit and vegetable products by the MTN fruit and vegetable group of products for each of the EU-27 member states over the analyzed years (2000–2011) are available from the authors upon request.

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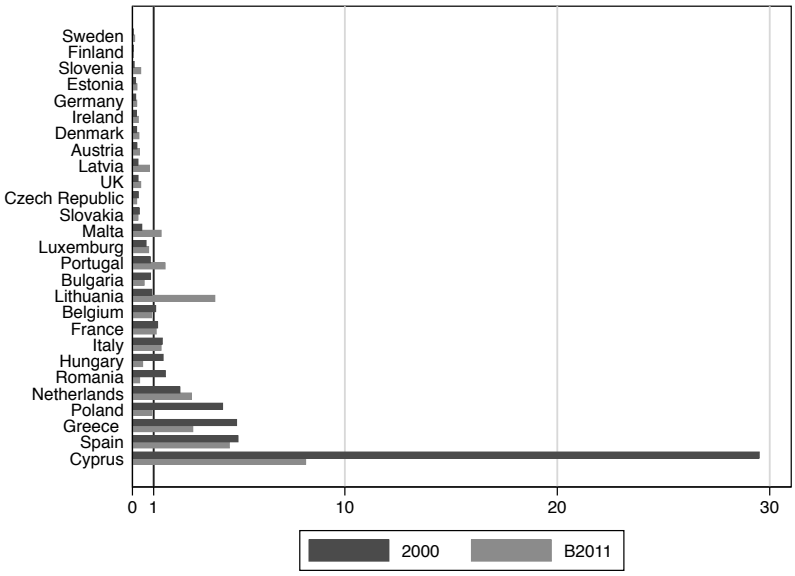

Figure 7. Revealed comparative advantage (RCA) indices for MTN 1201 – fruit and vegetable products fresh or dried of the EU-27 member states, 2000–2011

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

global markets for the MTN 1201: Belgium, Cyprus, France, Greece, Italy, Lithuania, the Netherlands, Poland, and Spain (Figure 7).

Hungary and Romania have lost the export competitiveness, while Malta and Portugal have gained the export competitiveness for the MTN 1201.

In addition to Hungary, Romania and the other fourteen of the EU-27 member states experienced the revealed comparative disadvantage (RCA < 1) in the global markets for the MTN 1201: Austria, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, Germany, Ireland, Latvia, Luxembourg, Slovakia, Slovenia, Sweden, and the UK.

Ten of the EU-27 member states experienced the revealed comparative advantage (RCA > 1) in the global markets for the MTN 1202: Belgium, Bulgaria, Estonia, Greece, Italy, Lithuania, the Netherlands, Poland, Romania, and Spain (Figure 8).

Latvia has gained the export competitiveness, while Cyprus, Denmark, Hungary and Portugal have lost the export competitiveness. In addition to the latter four countries, twelve other EU-27 member states experienced the revealed comparative disadvantage (RCA<1) in the global markets for the MTN 1202: Austria, the Czech Republic, Finland, France, Germany, Ireland, Luxembourg, Malta, Slovakia, Slovenia, Sweden, and the UK.

Ten of the EU-27 member states have experienced the revealed comparative advantage (RCA > 1) in the global markets for the MTN 1203: Belgium, Bulgaria, France, Greece, Hungary, Italy, the Netherlands, Poland, Portugal, and Spain (Figure 9).

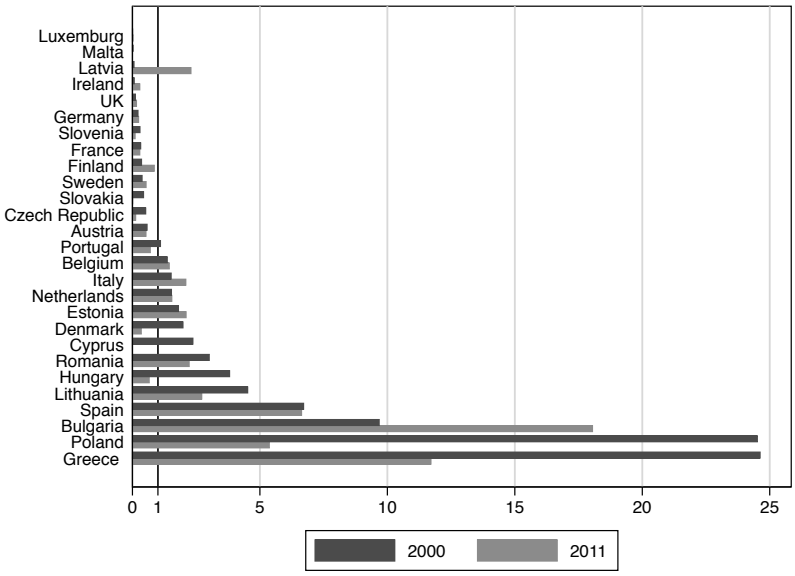

Figure 8. Revealed comparative advantage (RCA) indices for MTN 1202 – fruit and vegetable products semi-processed products of the EU-27 member states, 2000–2011

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

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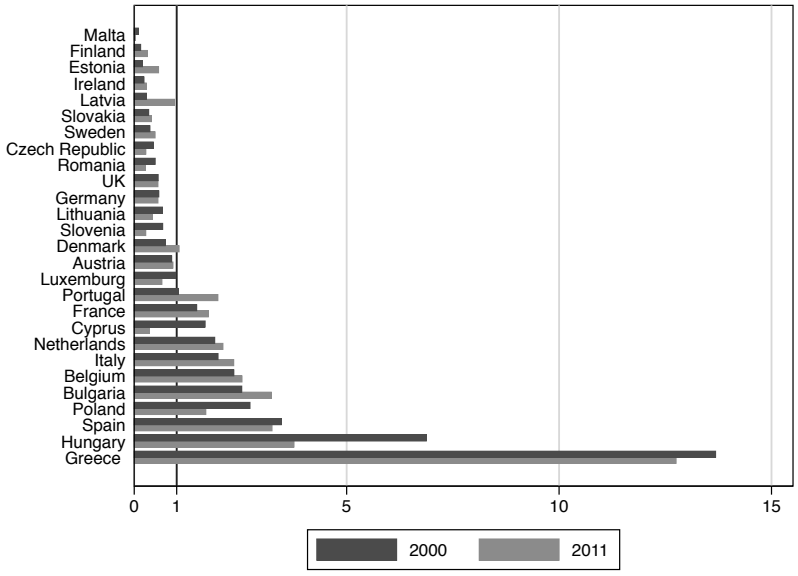

Figure 9. Revealed comparative advantage (RCA) indices for MTN 1203 – fruit and vegetable products prepared or preserved of the EU-27 member states, 2000-2011

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

Denmark and Latvia have gained the export competitiveness, while Cyprus and Luxembourg have lost the export competitiveness. In addition to the latter two countries, other thirteen of the EU-27 member states have experienced the revealed comparative disadvantage (RCA<1) in the global markets for the MTN 1203: Austria, the Czech Republic, Estonia, Finland, Germany, Ireland, Lithuania, Malta, Romania, Slovakia, Slovenia, Sweden, and the UK.

Mobility of the RCA indices

The degree of mobility in the RCA indices is estimated using the mobility index, M_1, based on the Markov transition probability matrices using a one year lag. The empirical results in Figure 10 indicate a relatively modest mobility in the RCA indices for the fruit and vegetable products for Austria and, to a lesser extent, for the following EU-27 member states: Ireland, the Czech Republic, Estonia, Latvia, Malta, Slovakia, and Slovenia. Except for Austria and Ireland, these are new EU member states, the export specialization in the fruit and vegetable products of which can explore some instabilities with some mobility in the evolution of patterns of the RCA indices.

The M_1 is a slightly lower, but still a slightly higher than 0.2 for the following EU-27 member states: Finland, Cyprus, Romania, Lithuania, Portugal, Denmark, Greece, Bulgaria, Germany, Luxembourg, the Netherlands, Poland, and Hungary. These M_1 indices are indicating a relatively low degree of mobility

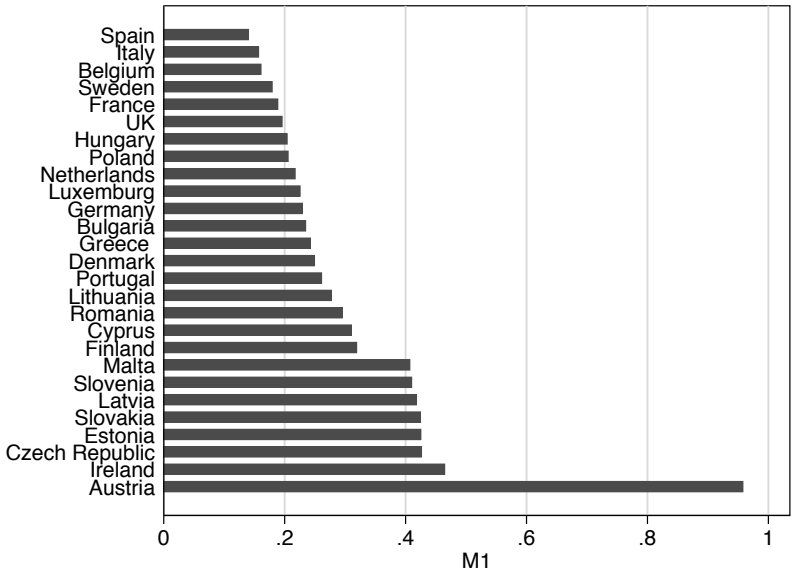

Figure 10. Mobility of RCA Indices for the fruit and vegetable products, 2000–2011

M_1 can take values: $0 < M_1 < 2$

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

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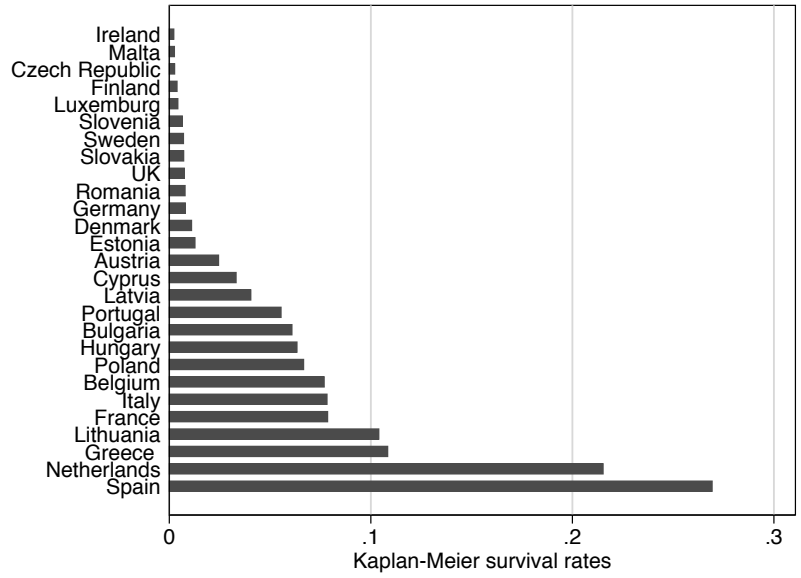
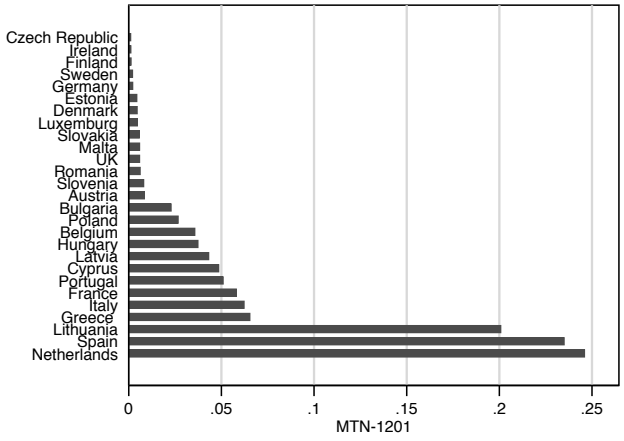


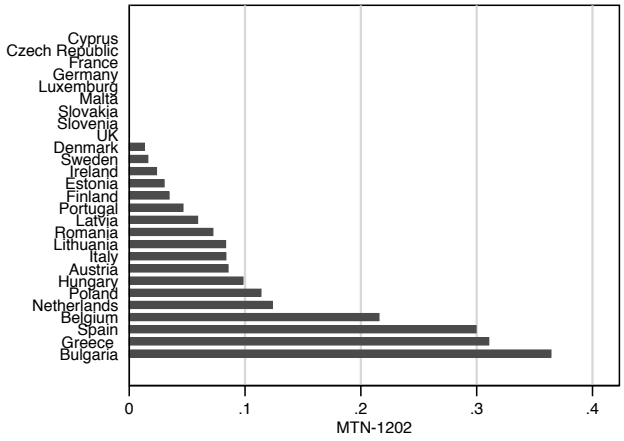
Figure 11. Kaplan-Meier Survival Rates for the revealed comparative advantage (RCA > 1) indices of the EU-27 member states

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

in the evolution of patterns throughout the entire distribution of the RCA indices in the global markets for the fruit and vegetable products.

The M_1 index is less than 0.2 indicating a rather high stability with a relatively low degree of the mobility in the evolution of patterns of the RCA indices for the fruit and vegetable products in the global markets for the following old EU-15 member states: Belgium, France, Italy, Spain, Sweden, and the UK. Their export specialization patterns for the fruit and vegetable products have been established with a high degree of stability.





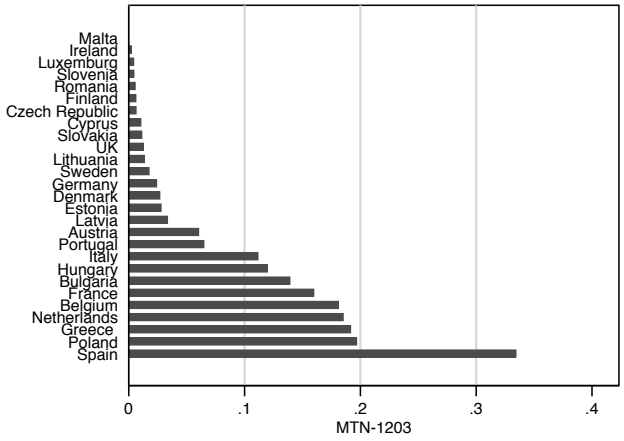


Figure 12. Kaplan-Meier Survival Rates for the revealed comparative advantage (RCA > 1) indices of the EU-27 member states and MTN fruit and vegetable product groups

Source: Own calculations based on the Comtrade database with the WITS (World Trade Integration Solution) software

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Duration Analysis of the RCA > 1 indices

The Kaplan-Meier survival rates in the year 12 (2011) for the fruit and vegetable products with the RCA > 1 indices in the global markets are the highest for Spain, the Netherlands, Greece, and Lithuania (Figure 11).

The duration of the RCA > 1 indices for Spain and the Netherlands is considerably longer than that for several other EU-27 member states with very low survival rates (less than 1%): Ireland, Malta, the Czech Republic, Finland, Luxembourg, Slovenia, Sweden, Slovakia, the UK, Romania, Germany, Denmark, and Estonia.

The survival rates by the MTN fruit and vegetable product groups are mixed (Figure 12). The survival rates of the RCA > indices in the global markets for the MTN 1201 are the highest for the Netherlands, Spain, and Lithuania. Cyprus, Luxembourg, Malta, and Slovenia experienced the highest survival rates of the RCA > 1 indices in the global markets in these group of fruit and vegetable products. However, for the last three countries, the survival rates in the year 12 are very low with less than 1% of the survival probability.

The Kaplan-Meier survival rates of the RCA > 1 index for the MTN 1202 are the highest for Bulgaria, Greece, Spain, and Belgium as well as the Netherlands and Poland. Except for Spain, the Netherlands, and Poland, these countries have also the highest survival rates for the RCA > 1 index in the global markets for this group of products among the MTN fruit and vegetable product groups. This finding holds also for the following EU member states: Austria, Estonia, Finland, Ireland, Latvia, and Romania. However, their Kaplan-Meier survival rates in the year 12 are relatively lower in comparison for example with Bulgaria.

The Kaplan-Meier survival rates of the RCA > 1 index for the MTN 1203 are the highest for Spain as well as for Poland, Greece, the Netherlands, and Belgium. Except for Greece, the Netherlands and Belgium, in this group of the fruit and vegetable products the highest survival rates of the RCA > 1 index in the global markets are also for the Czech Republic, Denmark, France, Germany, Hungary, Italy, Portugal, Slovakia, Sweden, and the UK. However, for some of these EU member states, the survival rates are relatively low, e.g. less than 1% for the Czech Republic in the year 12.

To sum up, in spite of some heterogeneity of the Kaplan-Meier survival rates of the RCA > 1 indices between the MTN fruit and vegetable groups of products of EU member states, Spain has experienced relatively higher survival rates for the RCA > 1 indices in the global markets in the analysed year 12 by each of the MTN fruit and vegetable groups of products. Spain has experienced higher probabilities of survival in the year 12 between 23.5% for the MTN 1201 and 33.4% for the MTN 1203. This is followed by the Netherlands, with the probability of survival in the year 12 ranged between 12.4% for the MTN 1202 and 24.6% for the MTN 1201. Lithuania is a special case with higher survival rates for the MTN 1201; Bulgaria, Greece and Belgium for MTN 1202; and Poland and Greece for the MTN 1203.

DISCUSSION

The fruit and vegetable products chain export specialization of the EU-27 member states is largely based on certain niche products, which can be also seasonally dependent, and/or differentiated products, which have been developed for the intra-EU-27 and extra-EU-27 global markets by food processing. The results indicate that the horticultural export specialization for most of the EU-27 member states still largely depends on the Mediterranean and Black Sea climatic conditions and the natural factor endowments. The major exception is the Netherlands and partly Belgium, which differ from the neighbouring countries in the region and the countries of the Northern part of Europe. This suggests that new technologies such as for example the greenhouse operation and global marketing strategies with the use of some so far less discovered natural local energy factor endowments, such as the geothermal water in a larger part of Central and Eastern Europe, as well as the presence of natural gas, can become important in the future greenhouse horticultural development and the fruit and vegetable products export specialization patterns.

Diversified climatic conditions, production seasonality, transportation and marketing with the fast perishable fruit and vegetable product can also explain some of the differences in the probabilities of survival for the RCA > 1 indices in the global markets (e.g. Schoorl and Holt 1982; Reardon et al. 2003; Svatoš et al. 2010; Bojnec and Fertő 2012a, b; Garcia Alvarez-Coque et al. 2012). For most of the EU-27 member states, the export specialization patterns between the differentiated fruit and vegetable chain products are of a shorter duration. These differences and covariates

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explaining the survival rates have policy implications explaining, for example, why the EU member states competitiveness is declining (e.g., Wijnands et al. 2007; Curran and Zignago 2009; FoodDrinkEurope 2012, 2014).

The Netherlands, partly Belgium and to a lesser extent Lithuania and Poland as the new EU member states are the examples where the shortcomings of the natural and climatic conditions can be offset by the technological advances and structural improvements in the vertical fruit and vegetable products export supply chains. This suggests the importance of innovation in technology improvements to achieve market success. Higher valued types of the fruit and vegetable products require a more complex knowledge involved, technological endowments and a more dynamic entrepreneurial business and international marketing activities for a long-term sustainable duration of the RCA > 1 indices for the differentiated fruit and vegetable chain products.

CONCLUSIONS

Our results suggest that the most export competitive EU-27 member states in the global fruit and vegetable product chain markets are competitive in each or most stages of the fruit and vegetable sector export supply chain, according to the level of the fruit and vegetable product processing and marketing. In contrast, the EU-27 member states with uncompetitive exports are not competitive in all or most stages of the fruit and vegetable sector export chain, regardless of the level of the fruit and vegetable product processing. For most of the EU-27 member states, there are identified fluctuations in the RCA indices in the global markets from-year-to-year, which can be explained by annual fluctuations in the production and exports of the fruit and vegetable products.

Among the issues for the future research, there are the fruit and vegetable chain products export competitiveness in the intra-EU-27 member states market and in the extra-EU-27 global markets by some other main players and competitors in the global horticultural market such as the North America, Asia with China and India, Australia and New Zealand, South America and Africa. This would include the situation of the global markets by different competitors in the fruit and vegetable production with different sources of the comparative advantages from the favourable natural and climatic conditions to advanced technologies and innovation in the advanced marketing and global promotion activities.

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