

FRUIT AND VEGETABLE TRADE COMPETITIVENESS OF EUROPEAN UNION COUNTRIES

ŠTEFAN BOJNEC¹ und IMRE FERTŐ^{2,3}

¹ University of Primorska, Faculty of Management
SI-6104 Koper, Cankarjeva 5

² Corvinus University of Budapest, Department of Agricultural Economics and Rural Development
H-1093 Budapest, Fővám tér 8

³ Institute of Economics, Hungarian Academy of Sciences
H-1112 Budapest, Budaörsi u. 45
E-Mail: Stefan.Bojnec@fm-kp.si; Stefan.Bojnec@siol.net

This paper investigates competition categories in the structure of fruit and vegetable trade in the European Union (EU) countries in the 2000 to 2011 period. Data were obtained on the World Bank's data portal and analyzed using applied trade methodology and duration analysis. The proportion of the competition category with a trade surplus at higher export-to-import unit value was greater among EU countries than the proportion of the competition category with a trade surplus at lower export-to-import unit value. These two competition categories with trade surplus accounted for a larger share than the competition categories with trade deficit at higher export-to-import unit value and with trade deficit at lower export-to-import unit value. For most of the fruit and vegetable products, especially processed ones in the EU countries, greater export than import unit values were ascertained. The smaller proportion was one-way trade with only export or only import.

Keywords: fruit and vegetable, export-to-import unit value, trade competition categories, one-way trade, survival analysis, European Union

Wettbewerbsfähigkeit der Staaten der Europäischen Union in Bezug auf Handel mit Obst und Gemüse. Im Rahmen dieser Arbeit wurden die Wertschöpfungsketten für Obst und Gemüse in den einzelnen Ländern der Europäischen Union analysiert. Die verwendeten Daten stammten vom Datenportal der Weltbank und umfassten den Zeitraum von 2000 bis 2011. Auf Basis von Handelsbilanzdaten und Ausfuhr- sowie Einfuhrdurchschnittswerten wurden Wettbewerbskategorien erstellt. Am Gesamthandel der EU-Länder hatte die Kategorie mit Handelsüberschuss bei höherem Ausfuhr- als Einfuhrdurchschnittswert einen höheren Anteil als die Kategorie mit Handelsüberschuss bei geringerem Ausfuhr- als Einfuhrdurchschnittswert. Die beiden Kategorien mit Handelsüberschüssen hatten eine größere Bedeutung für den Obst- und Gemüsehandel als die Kategorien mit Handelsdefiziten, sowohl bei höherem als auch bei geringerem Ausfuhr- als Einfuhrdurchschnittswert. Für die meisten Obst- und Gemüseprodukte, insbesondere für verarbeitete Ware, wurden höhere Export- als Importdurchschnittswerte ermittelt. Einseitig gerichteter Handel, entweder nur Export oder nur Import, spielte keine so große Rolle.

Schlagwörter: Obst und Gemüse, Export/Import-Durchschnittswerte, Handelswettbewerbskategorien, einseitig gerichteter Handel, Überlebensanalyse, Europäische Union

The international trade in fruit and vegetable products has increased rapidly (FAO, 2013), which has motivated our research. This increasing pattern in development of international trade in fruit and vegetable products is a relevant subject for research and practice. First, there is a lack of research on global trade in fruit and vegetable products and its comparative analysis. Second, there is an increasing importance of fruit and vegetable products in international agri-food trade for covering rising demands in consumption. This is a challenging issue for the horticultural sector and its structural changes towards changing trends in nutrition demand in global markets. Changes in global fruit and vegetable markets are developing in direction of fewer and larger horticultural growers and an increasing role of a concentration of the retail pathways on supply side (DEHNEN-SCHMUTZ et al., 2010). The changing complexity of fruit and vegetable market structures might have impact on fruit and vegetables trade competitiveness and their long-term sustainable development (SANSAVINI, 1997).

This paper aims to analyze trade competitiveness for fruit and vegetable products in the European Union's (EU-27) member states on global markets. The EU-27 member states have, with some annual variations, experienced deterioration in the export shares for fruit and vegetable products on the global markets. According to UNDS (2013) data, the EU-27 member states export share in 2011 was 39.6 % (71.6 billion US dollars). The decline in the EU-27 member states export share has been for major exporting countries of fruit and vegetable products such as for Spain, Italy, France, Belgium, Greece, and a slight decline has been for the Netherlands. A slight increase in the export share for fruit and vegetable products on the global markets has been achieved from relatively smaller EU exporters of fruit and vegetable products such as Austria and Portugal and from some new EU member states such as Poland, Lithuania, Bulgaria and the Czech Republic. The EU-27 member states are net importing fresh and processed tropical fruit products. Trade in fresh and processed vegetables has been rather balanced with trade surplus or positive trade balance (export minus imports) of vegetables from Mediterranean countries as well as the Netherlands and Belgium.

The paper presents original empirical results and their cross-country comparisons of price and quality compe-

titiveness for fruit and vegetable products in the EU-27 member states on global markets. The results can contribute to a better understanding of fruit and vegetable trade performance and its duration over the analysed period.

MATERIALS AND METHODS

TRADE COMPETITION CATEGORIES AND ONE-WAY TRADE

Export-to-import unit values are used as proxies for export/import prices to study which fruit and vegetable product markets are dominated by price or non-price factors. Export unit value for a given fruit and vegetable product is calculated as a ratio between its value of exports in US dollars and its quantity of exports, while import unit value for a given fruit and vegetable product is calculated as a ratio between its value of imports in US dollars and its quantity of imports. Quantities of export/import are expressed in a physical unit, e. g. in kilos for a given fruit and vegetable product.

Trade balances for net directions of trade in matched two-way trade are used to disentangle between successful bilateral trade with trade surplus (total export value is greater than total import value) and unsuccessful bilateral trade with trade deficit (total export value is smaller than total import value) for a given fruit and vegetable product. Matched two-way trade for a given fruit and vegetable product means that this product is simultaneously exported and imported. Otherwise, in a case of unmatched or one-way trade, a given fruit and vegetable product is either only exported or only imported.

We combine a given fruit and vegetable product trade balance for direction of trade (trade surplus or trade deficit) and export-to-import unit values to classify price competition and non-price competition categories in trade data. More specifically, we use unit values of export and unit values of import as proxies for export-to-import price difference for a given fruit and vegetable product with its trade balance for direction of trade to categorize success or unsuccess of trade flows. They were used for assessing product price competition and product quality competition in two-way matched trade in four competition categories (GEHLHAR and PICK, 2002):

Category 1 – Successful price competition. Trade surplus is achieved with lower export price than import price. Successful means a positive net trade flow, because total export value is greater than total import value.

Category 2 – Unsuccessful price competition. Trade deficit is achieved with higher export price than import price. Unsuccessful means a negative net trade flow, because total value of export is smaller than total value of import. Unsuccessful price competition means that higher export price than import price reduces price competitiveness, which in turn leads to trade deficit.

Category 3 – Successful quality competition. Trade surplus is achieved with higher export price than import price. Successful means again a positive net trade flow, because total export value is greater than total import value. Successful quality competition means that a country is able to achieve trade surplus at higher export price than import price. Therefore, the term quality does not mean quality in technological terms, but in economic terms as higher price is assumed to reflect higher quality.

Category 4 – Unsuccessful quality competition. Trade deficit is achieved with lower export price than import price. Unsuccessful means a negative net trade flow, because total export value is smaller than total import value. Unsuccessful quality competition means that a country achieves trade deficit at lower export price than import price. The term quality is again used in economic terms as lower price is assumed to represent lower quality.

Finally, we classify the one-way trade with only export or only import, when the net direction of trade is either surplus or deficit (BOJNEC and FERTÓ, 2008b and 2012a): only export category or only import category. In this case export-to-import unit values cannot be calculated. It can be calculated only export unit value in the case of the one-way export or only import unit value in the case of the one-way import.

DURATION ANALYSIS

Duration analysis of Categories 1 and 3 in the EU-27 member states is estimated by the survival function using the nonparametric Kaplan-Meier product limit estimator (e. g. CLEVES et al., 2004; BOJNEC and FERTÓ, 2008a, 2012b, 2014a and 2014b). 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. The episodes of uninterrupted Categories 1 and 3 are the primary unit of analysis. The STATA data analysis and statistical software (STATA 13.0 Statacorp, College Station; Texas, USA) was used in the empirical analysis of the Kaplan-Meier survival rates (CLEVES et al., 2004).

DATA

The empirical analysis of the price competition and quality competition categories is conducted for the EU-27 member states using detailed trade data at the 6-digit World Customs Organization's Harmonized System (HS-6) level by the years 2000 to 2011. The United Nations International Trade Statistics UN COMTRADE database (UNSD, 2013) is used for the Multi-Lateral Trade Negotiations (MTN-4) codes, which includes three main categories for fruit and vegetable products: MTN 1201 – fruit and vegetables fresh or dried products (consisting of 87 HS-6 codes of fruit and vegetable product items), MTN 1202 – fruit and vegetables semi-processed products (consisting of 11 HS-6 codes of fruit and vegetable product items), and MTN 1203 – fruit and vegetables prepared or preserved products (consisting of 49 HS-6 codes of fruit and vegetable items).

The UNSD (2013) COMTRADE database is used with the World Bank's World Integrated Trade Solution (WITS) software, which data are freely downloaded from the World Bank's website <http://wits.worldbank.org/> (WORLD BANK, 2013). The UNSD (2013) concordance between the HS-6 codes and the MTN-4 systems for fruit and vegetable products are used. Table 1 describes the concordance between HS-6 and MTN-4 system codes and their product descriptions in order to know which fruit and vegetable products have been included in the study.

The empirical results are presented at the country's aggregated level for all fruit and vegetable products and separately for each of the three analyzed MTN-4 fruit and vegetable product codes. The focus in the presentation of the empirical results is on the single most important trade competition categories in the structure of fruit and vegetable trade to clearly illustrate successful competi-

tion or unsuccessful competition in fruit and vegetable trade in the EU-27 member states on the global markets and by main fruit and vegetable MTN value chain groups. We aim to explain the structures of the most important competition categories in the EU-27 member states.

RESULTS AND DISCUSSION

TRADE STRUCTURES FOR FRUIT AND VEGETABLE PRODUCTS IN THE EU-27 MEMBER STATES

Figure 1 illustrates the structure of trade for fruit and vegetable products in the EU-27 member states. The structure of trade comprises price competition and quality competition categories and one-way trade. Fruit and vegetable products are classified according to the HS-6 code description, which is presented in Table 1. According to the relative size (percentages) of price competition and quality competition categories and one-way trade in the structure of fruit and vegetable global trade, the EU-27 member states are divided into four groups of countries.

First, these are countries that have experienced the greater shares of successful price competition and successful quality competition categories. Fourteen of the EU-27 member states have experienced the greater shares of successful price competition and successful quality competition categories. Fourteen of the EU-27 member states have experienced the highest single share in Category 3, followed by Category 1: Austria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, France, Greece, Italy, Lithuania, Luxembourg, the Netherlands, Spain, and Sweden. Four of the EU-27 member states have experienced the highest single share in Category 1, followed by Category 3: Hungary, Ireland, Poland, and Portugal. Second, these are countries with successful price competition or successful quality competition category, and then followed by unsuccessful price or unsuccessful quality competition category. Latvia and Romania have experienced the highest single share in Category 3, followed by Category 2, while Slovenia in Category 1, follo-

wed by Category 4.

Third, these are countries with unsuccessful price competition or unsuccessful quality competition category, and then followed by successful price competition or successful quality competition category. Finland and Malta have experienced the highest single share in Category 4, followed by Category 3. The Czech Republic, Slovakia, and the United Kingdom (UK) have experienced the highest single share in Category 2, followed by Category 4.

Finally, this is a country with both unsuccessful price competition and unsuccessful quality competition categories. Germany has experienced the highest single share in Category 4, followed by Category 2.

To sum up, the results clearly indicate similarities and differences between the analyzed EU-27 member states. While the first category contains the most successful group of the EU-27 member states according to the trade competition categories in the two-way matched trade for fruit and vegetable products, the last group with Germany indicates the worst performing EU-27 member state according to the trade competition categories. These empirical facts clearly indicate heterogeneity between the EU-27 member states. As interesting, in the first group are not only Mediterranean and the Black Sea EU countries with warmer climatic conditions, but also some continental EU countries. The reasons for these patterns in development in the EU trade competitiveness can be explained by adjustments of productions to their different conditions and advantages. In addition to the natural conditions, they can be developed by using advanced technologies in production, management and international marketing approaches with specialization of production, processing and trade on globally competitive products.

Finally, to summarize the results by competition categories, Category 1 has the lowest single share for Latvia and the greatest single share for Ireland, Category 2 for Cyprus (lowest) and the Czech Republic (highest), Category 3 for Slovenia (lowest) and Luxembourg (highest), and Category 4 for Luxembourg (lowest) and Finland (highest). The share of only one-way export flows is relatively the highest for Cyprus, while the share of only one-way import flows is relatively the highest for Malta.

TRADE STRUCTURES FOR FRUIT AND VEGETABLE PRODUCTS IN THE EU-27 MEMBER STATES FOR THE MTN-4 CODE GROUPS BY DEGREE OF PROCESSING FOR FINAL CONSUMPTION

According to the MTN-4 code description groups, fruit and vegetable products are classified in three groups according to the degree of processing. The concordance between the MTN-4 code description and the HS-6 code description for fruit and vegetable products is presented in Table 1. Therefore, this section focuses on the analysis of sub-groups from fresh or dried products, then semi-processed, up to prepared or preserved products for final consumption.

The results for the MTN 1201 – fruit and vegetables fresh or dried products are rather mixed (Fig. 2). The first group of countries consists of those EU-27 member states with the greatest single shares of successful price competition and successful quality competition categories. Seven of the EU-27 member states have experienced the greatest single share of Category 3, followed by Category 1: Belgium, Cyprus, Greece, Ireland, Lithuania, the Netherlands, and Spain. Four of the EU-27 member states have experienced the greatest single share of Category 1, followed by Category 3: Denmark, France, Hungary, and Italy.

The second group of countries consists of those EU-27 member states with successful price competition or successful quality competition category, followed by unsuccessful price competition or unsuccessful quality competition category. Austria, Bulgaria, Latvia, and Luxembourg have experienced the greatest single share of Category 3, followed by Category 2. Germany, Poland, and Slovenia have experienced the greatest single share of Category 1, followed by Category 4; Portugal the greatest single share of Category 1, followed by Category 2; Malta and Romania the greatest single share of Category 3, followed by Category 4.

The third group of countries consists of Finland, which has experienced the greatest single share of Category 4, followed by Category 1.

Finally, the group of the EU-27 member states with unsuccessful price competition and unsuccessful quality competition categories. The highest single shares of unsuccessful competition categories are for the Czech Republic, Slovakia, Sweden, and the UK, which have experienced the highest single share of Category 2, followed by Category 4; and Estonia with the highest single share of Category 4, followed by Category 2.

According to the four competition categories, Category 1 has the lowest single share for Latvia and the highest single share for Slovenia; Category 2 for Cyprus (lowest) and the Czech Republic (highest); Category 3 for the Czech Republic and Austria; and Category 4 for Ireland and Finland. The one-way export share is relatively the highest for Cyprus and the one-way import share is relatively the highest for Malta.

The results for the MTN 1202 – fruit and vegetables semi-processed products are also mixed among the EU-27 member states (Fig. 3). The first group of countries consists of those EU member states with the greatest single shares of successful price competition and successful quality competition categories. Six of the EU-27 member states have experienced the highest single share of Category 3, followed by Category 1: Belgium, Estonia, Hungary, Lithuania, Poland, and Romania. Three of the EU-27 member states have experienced the highest single share of Category 1, followed by Category 3: Finland, Greece, and Sweden.

The second group of countries consists of those EU member states with the greatest single share of successful price competition or successful quality competition category, followed by unsuccessful price competition or unsuccessful quality competition category. Belgium, Ireland, Latvia, and the Netherlands have experienced the highest single share of Category 3, followed by Category 2, while Italy, Portugal, and Spain have the highest single share of Category 3, followed by Category 4.

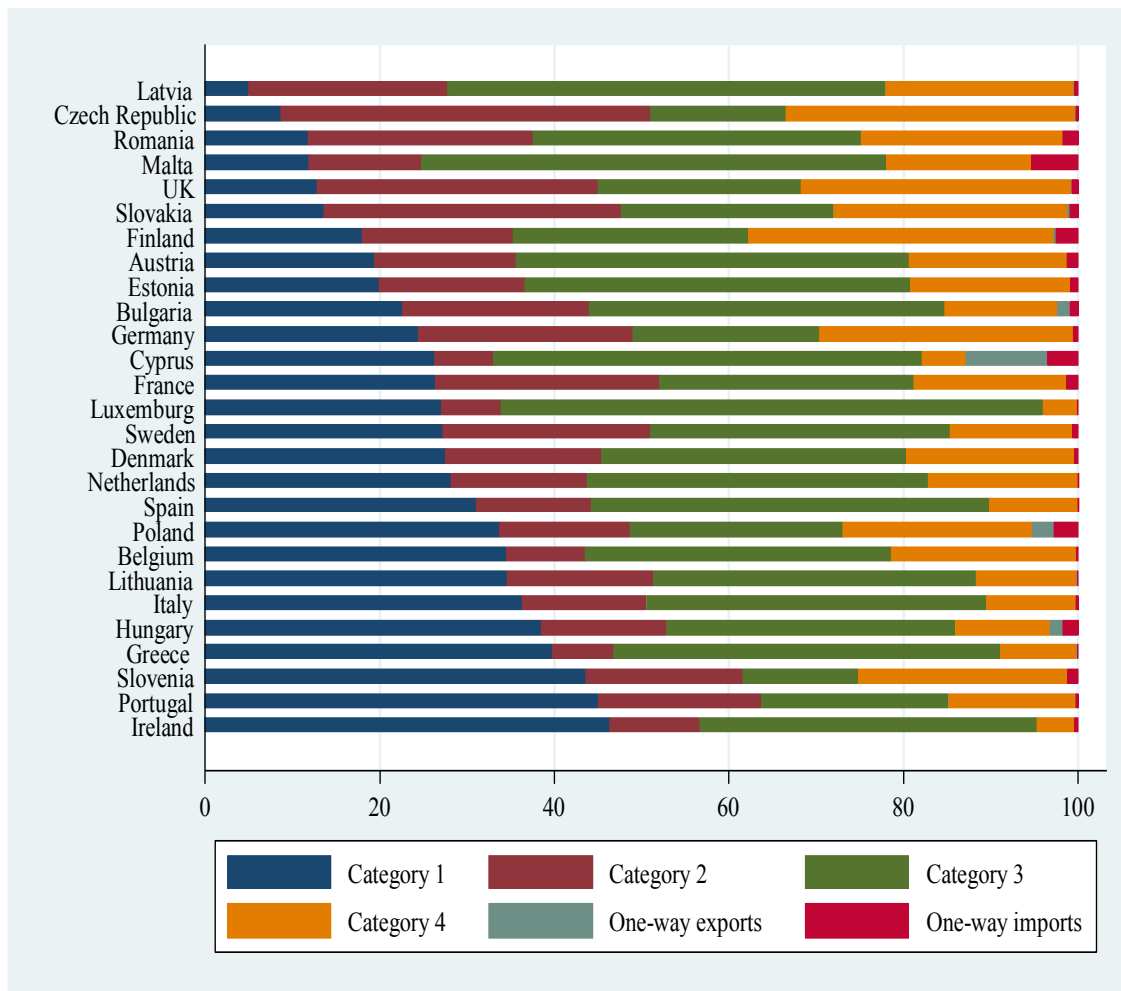


Fig. 1: Price competition and quality competition categories and one-way trade for fruit and vegetable products in the EU-27 member states (structures in %, mean values, 2000 to 2011)

Note: Category 1 – successful price competition, Category 2 – unsuccessful price competition, Category 3 – successful quality competition, and Category 4 – unsuccessful quality competition. Source: Authors’ calculations based on UNSD (2013) COMTRADE database with World Trade Integration Solution (WITS) software (WORLD BANK, 2013).

Table 1: Concordance between the MTN-4 code description and the HS-6 code description for fruit and vegetable products.
Source: UNSD (2013)

MTN-4 code description	HS-6 code description
1201: Fruit and vegetables fresh or dried	070110 – Seed 070190 – Other 070200 – Tomatoes, fresh or chilled 070310 – Onions and shallots 070320 – Garlic 070390 – Leeks and other alliaceous vegetables 070410 – Cauliflowers and headed broccoli 070420 – Brussels sprouts 070490 – Other 070511 – Lettuce : – Cabbage lettuce (head lettuce) 070519 – Lettuce : – Other 070521 – Chicory : – Witloof chicory (<i>Cichorium intybus</i> var. <i>foliosum</i>) 070529 – Chicory : – Other 070610 – Carrots and turnips 070690 – Other 070700 – Cucumbers and gherkins, fresh or chilled 070810 – Peas (<i>Pisum sativum</i>) 070820 – Beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.) 070890 – Other leguminous vegetables 070910 – Globe artichokes 070920 – Asparagus 070930 – Aubergines (egg-plants) 070940 – Celery other than celeriac 070951 – Mushrooms and truffles : – Mushrooms 070952 – Mushrooms and truffles : – Truffles 070960 – Fruits of the genus <i>Capsicum</i> or of the genus <i>Pimenta</i> 070970 – Spinach, New Zealand spinach and orache spinach (garden spinach) 070990 – Other 071310 – Peas (<i>Pisum sativum</i>) 071320 – Chickpeas (<i>garbanzos</i>) 071331 – Beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.) : – Beans of the species <i>V. mungo</i> (L.) Hepper or <i>V. radiata</i> (L.) Wilczek 071332 – Beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.) : – Small red (Adzuki) beans (<i>Phaseolus</i> or <i>Vigna angularis</i>) 071333 – Beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.) : – Kidney beans, including white pea beans (<i>Phaseolus vulgaris</i>) 071339 – Other 071340 – Lentils 071350 – Broad beans (<i>Vicia faba</i> var. <i>major</i>) and horse beans (<i>Vicia faba</i> var. <i>equina</i> , <i>Vicia faba</i> var. <i>minor</i>) 071390 – Other 071410 – Manioc (cassava) 071420 – Sweet potatoes 071490 – Other 080111 – Coconuts : – Desiccated 080119 – Coconuts : – Other 080121 – Brazil nuts : – In shell 080122 – Brazil nuts : – Shelled 080131 – Cashew nuts : – In shell 080132 – Cashew nuts : – Shelled 080211 – Almonds : – In shell 080212 – Almonds : – Shelled 080221 – Hazelnuts or filberts (<i>Corylus</i> spp.) : – In shell 080222 – Hazelnuts or filberts (<i>Corylus</i> spp.) : – Shelled 080231 – Walnuts : – In shell 080232 – Walnuts : – Shelled 080240 – Chestnuts (<i>Castanea</i> spp.) 080250 – Pistachios 080290 – Other 080300 – Bananas, including plantains, fresh or dried

Table 1 (cont.): Concordance between the MTN-4 code description and the HS-6 code description for fruit and vegetable products

MTN-4 code description	HS-6 code description
1201 (cont.): Fruit and vegetables fresh or dried	080410 – Dates 080420 – Figs 080430 – Pineapples 080440 – Avocados 080450 – Guavas, mangoes and mangosteens 080510 – Oranges 080530 – Lemons (<i>Citrus limon</i> , <i>Citrus limonum</i>) and limes (<i>Citrus aurantifolia</i>) 080540 – Grapefruit 080590 – Other 080610 – Fresh 080620 – Dried 080711 – Melons (including watermelons) : – Watermelons 080719 – Melons (including watermelons) : – Other 080720 – Papaws (papayas) 080810 – Apples 080820 – Pears and quinces 080910 – Apricots 080920 – Cherries 080930 – Peaches, including nectarines 080940 – Plums and sloes 081010 – Strawberries 081020 – Raspberries, blackberries, mulberries and loganberries 081030 – Black, white or red currants and gooseberries 081040 – Cranberries, bilberries and other fruits of the genus <i>Vaccinium</i> 081050 – Kiwifruit 081090 – Other 081310 – Apricots 081320 – Prunes 081330 – Apples 081340 – Other fruit 081350 – Mixtures of nuts or dried fruits of this Chapter
1202: Fruit and vegetables semi- processed	071110 – Onions 071120 – Olives 071130 – Capers 071140 – Cucumbers and gherkins 081110 – Strawberries 081120 – Raspberries, blackberries, mulberries, loganberries, black, white or red currants and gooseberries 081190 – Other 081210 – Cherries 081220 – Strawberries 081290 – Other 081400 – Peel of citrus fruit or melons (including watermelons), fresh, frozen, dried or provisionally preserved in brine, in sulphur water or in other preservative solutions
1203: Fruit and vegetables prepared or preserved	071010 – Potatoes 071021 – Leguminous vegetables, shelled or unshelled : – Peas (<i>Pisum sativum</i>) 071022 – Leguminous vegetables, shelled or unshelled : – Beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.) 071029 – Leguminous vegetables, shelled or unshelled : – Other 071030 – Spinach, New Zealand spinach and orache spinach (garden spinach) 071040 – Sweet corn 071080 – Other vegetables 071090 – Mixtures of vegetables 071220 – Onions 071230 – Mushrooms and truffles

Table 1 (cont.): Concordance between the MTN-4 code description and the HS-6 code description for fruit and vegetable products

MTN-4 code description	HS-6 code description
1203 (cont.): Fruit and vegetables prepared or preserved	110510 – Flour, meal and powder 110520 – Flakes, granules and pellets 110610 – Of the dried leguminous vegetables of heading No. 07.13 110620 – Of sago or of roots or tubers of heading No. 07.14 110630 – Of the products of Chapter 8 200110 – Cucumbers and gherkins 200120 – Onions 200190 – Other 200210 – Tomatoes, whole or in pieces 200290 – Other 200310 – Mushrooms 200320 – Truffles 200410 – Potatoes 200490 – Other vegetables and mixtures of vegetables 200510 – Homogenised vegetables 200520 – Potatoes 200540 – Peas (<i>Pisum sativum</i>) 200551 – Beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.) : – Beans, shelled 200559 – Beans (<i>Vigna</i> spp., <i>Phaseolus</i> spp.) : – Other 200560 – Asparagus 200570 – Olives 200580 – Sweet corn (<i>Zea mays</i> var. <i>saccharata</i>) 200590 – Other vegetables and mixtures of vegetables 200600 – Vegetables, fruit, nuts, fruit-peel and other parts of plants, preserved by sugar (drained, glazed or crystallised) 200710 – Homogenised preparations 200791 – Other : – Citrus fruit 200799 – Other 200811 – Nuts, ground-nuts and other seeds, whether or not mixed together : – Ground-nuts 200819 – Nuts, ground-nuts and other seeds, whether or not mixed together : – Other, including mixtures 200820 – Pineapples 200830 – Citrus fruit 200840 – Pears 200850 – Apricots 200860 – Cherries 200870 – Peaches 200880 – Strawberries 200891 – Other, including mixtures other than those of subheading No. 2008.19 : – Palm hearts 200892 – Other, including mixtures other than those of subheading No. 2008.19 : – Mixtures 200899 – Other, including mixtures other than those of subheading No. 2008.19 : – Other

Source: UNSD (2013)

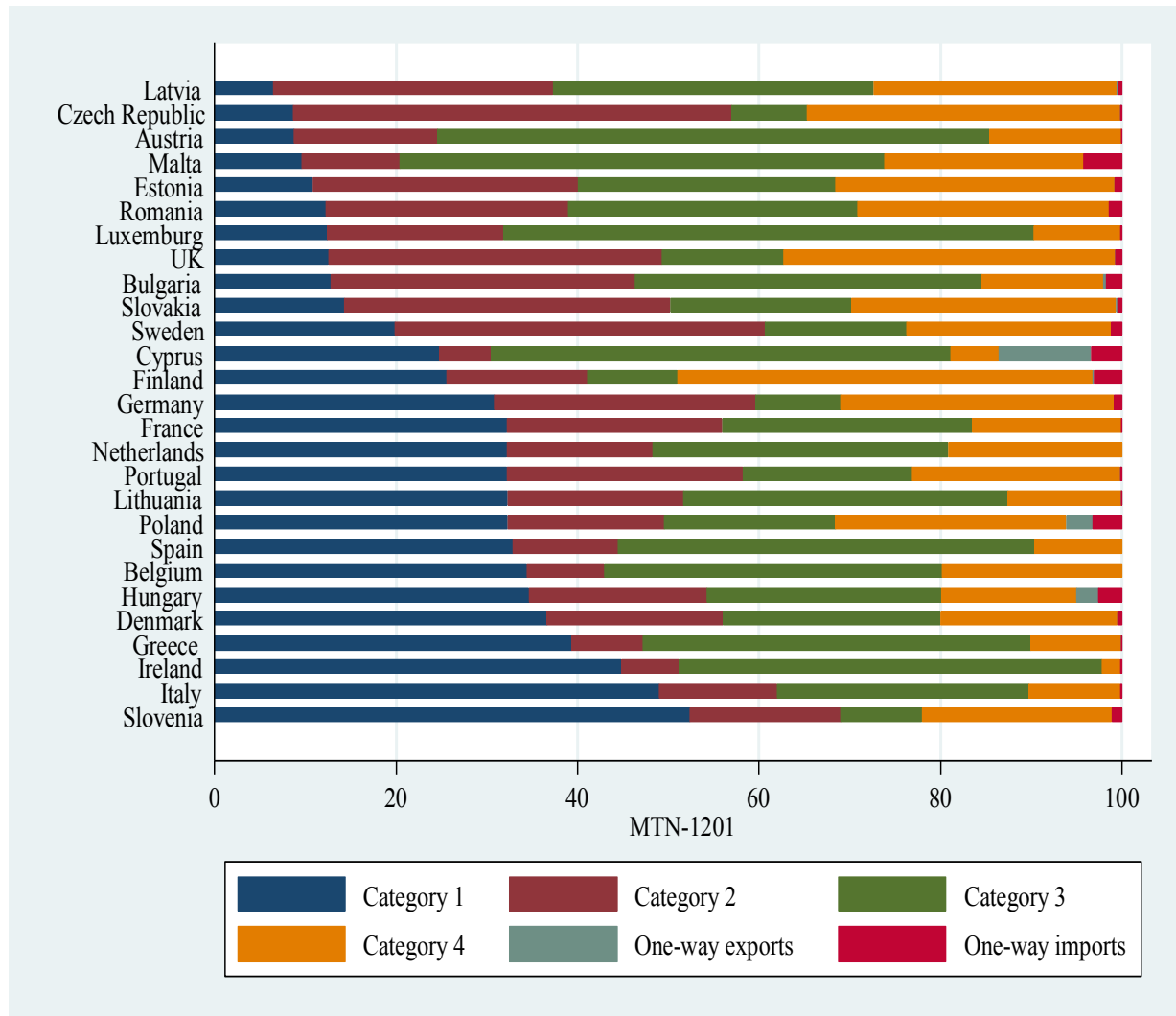


Fig. 2: Price competition and quality competition categories and one-way trade for MTN 1201 – fruit and vegetables fresh or dried products of the EU-27 member states (structures in %, mean values, 2000 to 2011)

Note: see Figure 1.

Source: Authors' calculations based on UNSD (2013) COMTRADE database with WITS (World Trade Integration Solution) software (WORLD BANK, 2013).

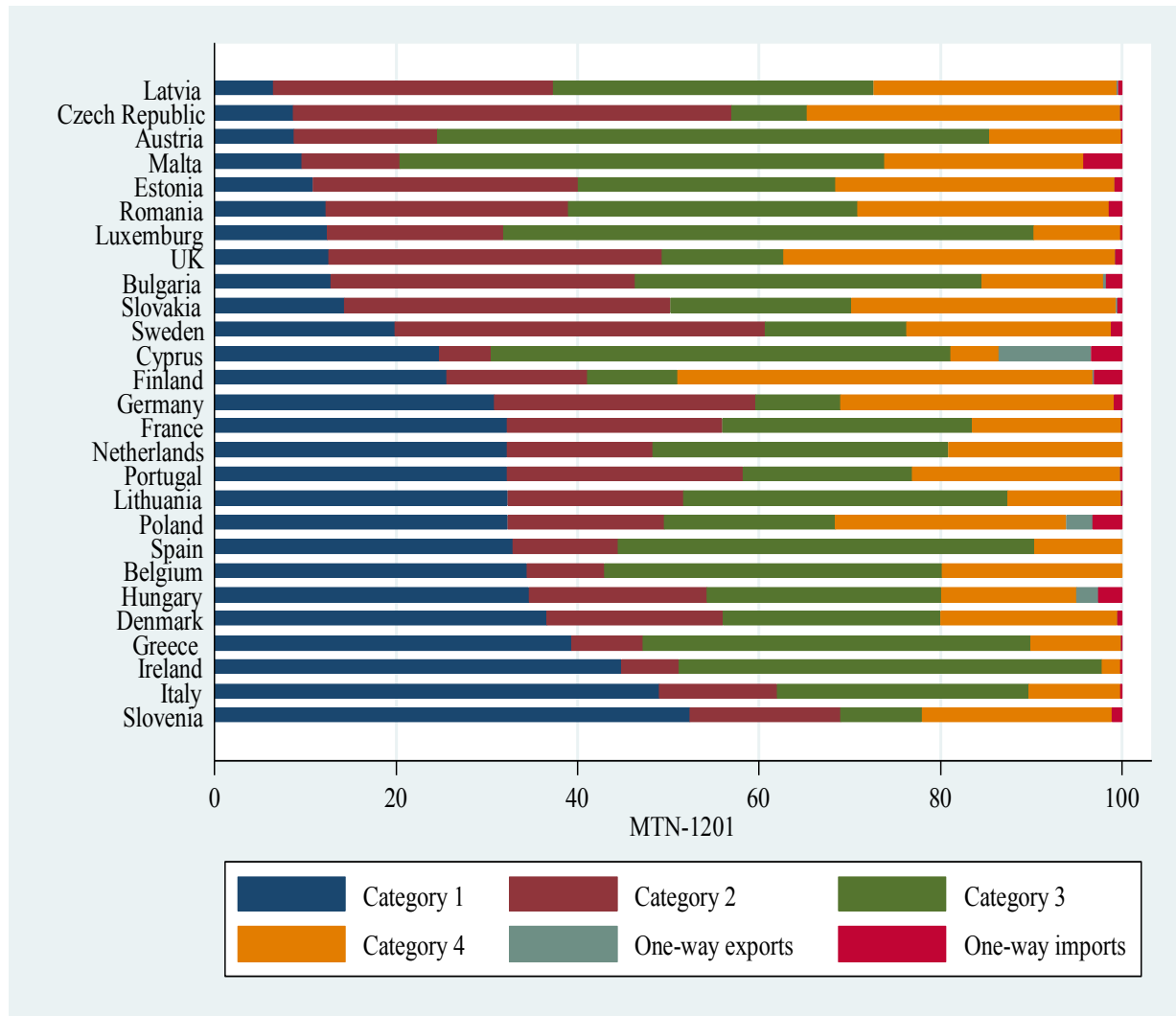


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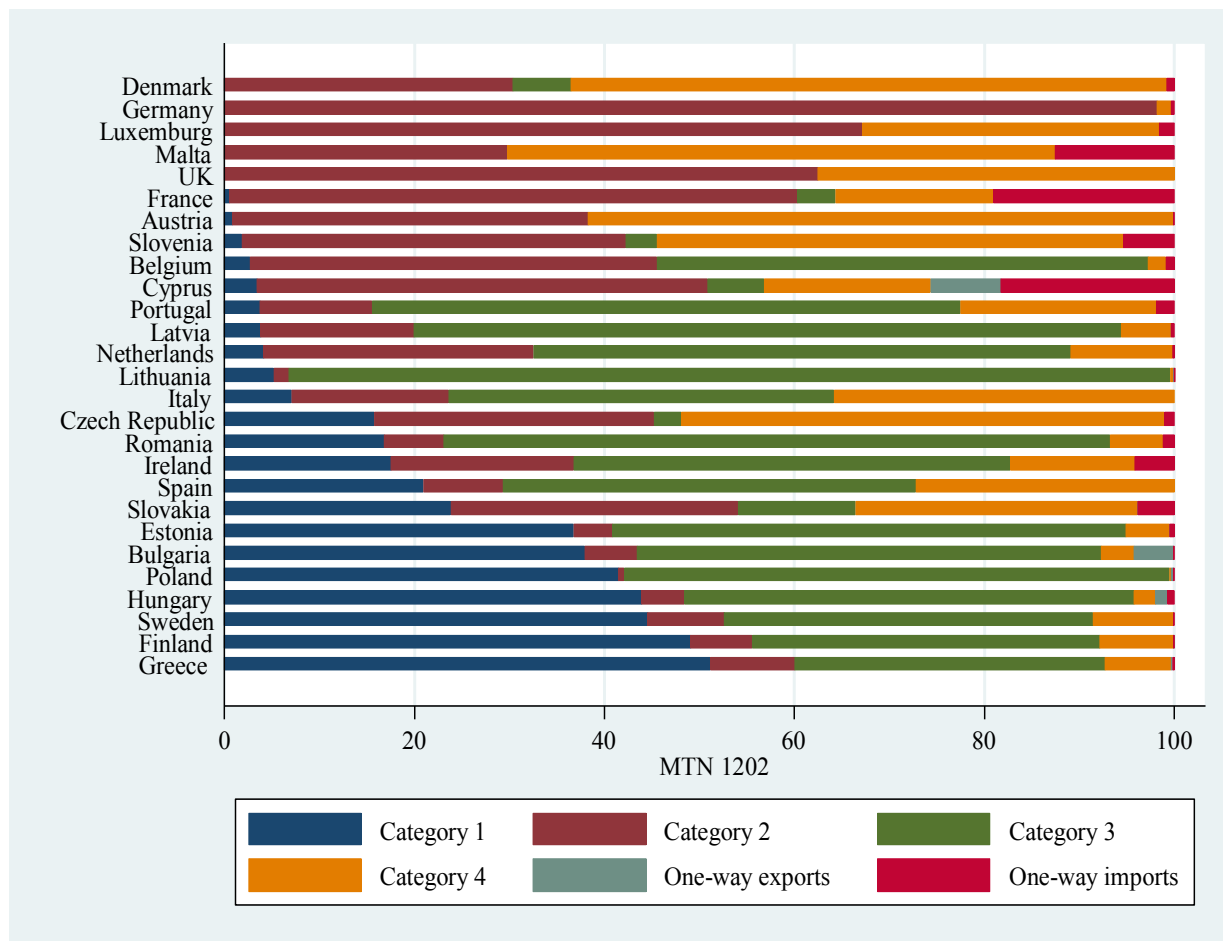


Fig. 3: Price competition and quality competition categories and one-way trade for MTN 1202 – fruit and vegetables semi-processed products of the EU-27 member states (structures in %, mean values, 2000 to 2011)

Note: see Figure 1.

Source: Authors' calculations based on UNSD (2013) COMTRADE database with WITS (World Trade Integration Solution) software (WORLD BANK, 2013).

Third, not any EU-27 member state is with the greatest single share of unsuccessful price competition or unsuccessful quality competition category, followed by successful price competition or successful quality competition category.

Finally, the fourth group of countries consists of those EU member states with the greatest single share of unsuccessful price and unsuccessful quality competition categories. Within this group of countries, the first group

consists of those EU member states with the highest single share of unsuccessful price competition (Category 2), followed by unsuccessful quality competition (Category 4): Cyprus, France, Germany, Luxembourg, Slovakia, and UK; and the second group consists of those EU member states with the highest single share of Category 4, followed by Category 2: Austria, the Czech Republic, Denmark, Malta, and Slovenia.

Considering the four competition categories, Category

1 has the lowest single share for Denmark, Germany, Luxembourg, Malta, and the UK, and the highest single share for Greece; Category 2 for Poland (lowest) and Germany (highest); Category 3 for Germany, Luxembourg, Malta, and the UK (lowest), and Lithuania (highest); and Category 4 for Poland (lowest) and Denmark (highest). The one-way export share is relatively the highest for Cyprus and the one-way import share is relatively the highest for France.

Most of the EU-27 member states are successful in price competition and quality competition for the MTN 1203 – fruit and vegetables prepared or preserved products (Fig. 4). The first group of countries consists of those EU member states with successful price competition and successful quality competition categories. Category 3 followed by Category 1 are the most important single categories in the trade structure for the following EU-27 member states: Austria, Bulgaria, Denmark, Estonia, Greece, Italy, the Netherlands, and Spain. Seven of the EU-27 member states have experienced the highest single share of Category 1, followed by Category 3: Belgium, Hungary, Lithuania, Luxembourg, Poland, Portugal, and Sweden.

The second group of countries consists of those EU member states with successful price competition or successful quality competition category, followed by unsuccessful price competition or unsuccessful quality competition category. France, Ireland, Latvia, Romania, Slovenia, and the UK have experienced the highest single share of Category 3, followed by Category 2; Slovakia the highest single share of Category 3, followed by Category 4; and Cyprus the highest single share of Category 1, followed by Category 2.

The third group of countries consists of those EU member states with unsuccessful price competition or unsuccessful quality competition category, followed by successful price competition or successful quality competition category. The Czech Republic and Germany have experienced the highest single share of Category 4, followed by Category 3; while Finland and Malta the highest single share of Category 2, followed by Category 4.

Finally, there is not any EU member state with un-

successful price competition and unsuccessful quality competition categories among two of the most important single competition categories for MTN 1203.

Considering the four competition categories, Category 1 has the lowest single share for Malta and the highest single share for Lithuania, Category 2 for Luxembourg (lowest) and Malta (highest), Category 3 for Malta (lowest) and Latvia (highest), and Category 4 for Luxembourg (lowest) and Germany (highest). The share of the one-way export is relatively the highest for Poland and the share of the one-way import is relatively the highest for Malta.

Differences through fruit and vegetable value chains for MTN 1201, MTN 1202 and MTN 1203 between the EU-27 member states have important practical consequences for the analyzed countries. The analyzed countries rely on different factors of trade competitiveness, which can be developed in countries with most successful competition trade categories such as for the Netherlands and Spain or cannot be developed in countries with less successful competition trade categories such as for Malta throughout each stage of fruit and vegetable value chain. This heterogeneity in food supply chain competitiveness suggests that in addition to competitive primary fruit and vegetable production, competitive value chain consists of developed food processing and marketing focusing on quality and/or price, which are demanded and/or the consumers are willing to pay.

DURATION ANALYSIS OF CATEGORIES 1 AND 3

A successful bilateral trade with trade surplus (total export value is greater than total import value) is in the case of successful price competition (Category 1), successful quality competition (Category 3), and one-way exports. In these cases foreign demand for a given fruit and vegetable product (total export value) is greater than domestic demand for products from abroad (total import value). Trade surplus is important for additional

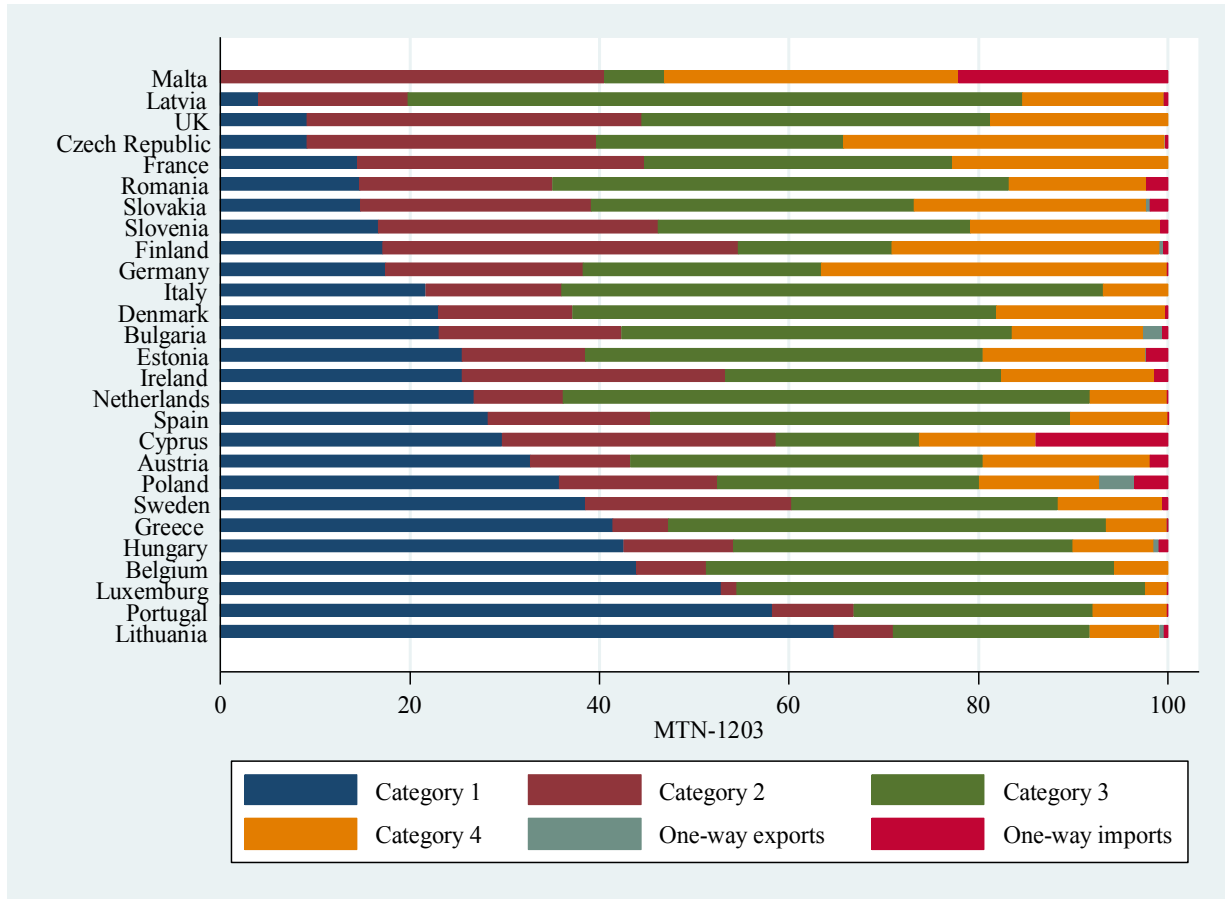


Fig. 4: Price competition and quality competition categories and one-way trade for MTN 1203 – fruit and vegetables prepared or preserved products of the EU-27 member states (structures in %, mean values, 2000 to 2011)

Note: see Figure 1.

Source: Authors' calculations based on UNSD (2013) COMTRADE database with WITS (World Trade Integration Solution) software (WORLD BANK, 2013).

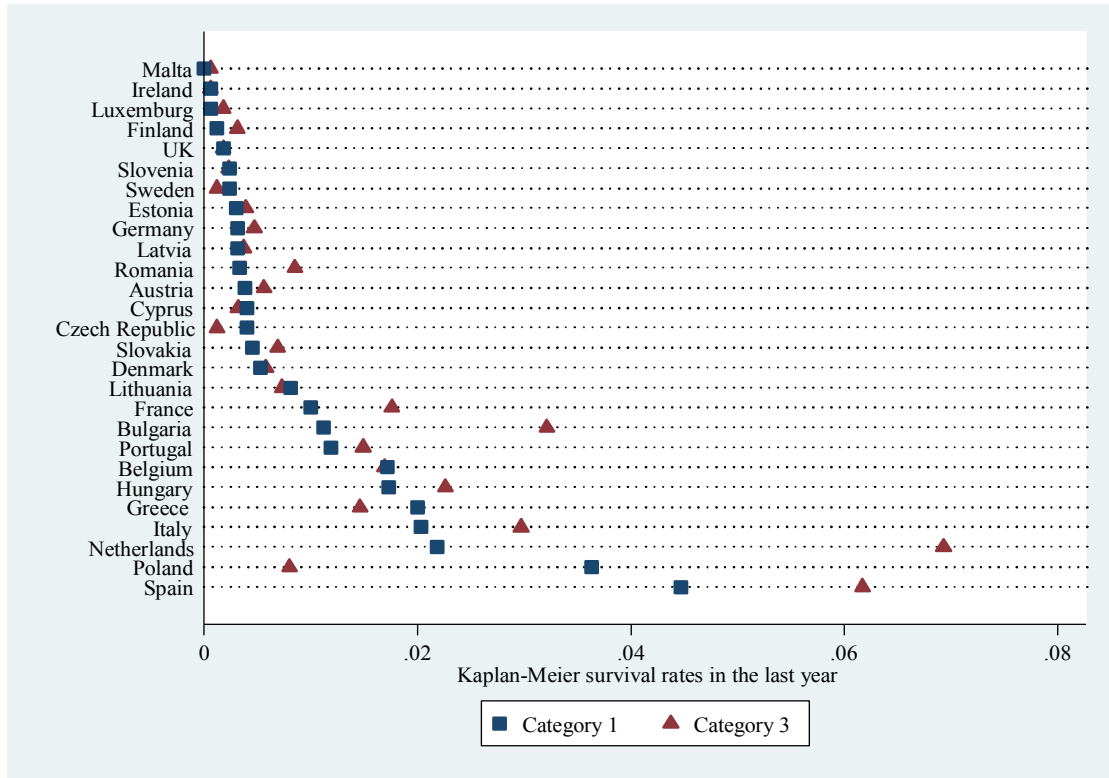


Fig. 5: Kaplan-Meier survival rates for fruit and vegetable products of successful competition Categories 1 and 3 (year 12, 2011)

Source: Authors' calculations based on UNSD (2013) COMTRADE database with WITS (World Trade Integration Solution) software (WORLD BANK, 2013).

demand from abroad and for growth of the fruit and vegetable sectors. As the share of one-way exports is negligible for each of the EU-27 member states, we focus only on the successful competition Categories 1 and 3. Figure 5 presents the Kaplan-Meier survival rates in the year 12 (2011) for fruit and vegetable products for Categories 1 and 3. The Kaplan-Meier survival rate in the year 12 (2011) for fruit and vegetable products for Category 1 is the highest for Spain and for Category 3 for the Netherlands. This result shows that Spain (followed by Poland, the Netherlands and Italy) in successful price competition and the Netherlands (followed by Spain, Bulgaria, Italy and Hungary) in successful quality competition have experienced the highest survival rates in these categories among the EU-27 member states over the all analyzed years in the 2000-2011 period. This implies that they have experienced relatively strong long-term competitiveness in the global fruit and vegetable markets.

On the other hand, the Kaplan-Meier survival rates in the year 12 (2011) for fruit and vegetable products long-term competitiveness are relatively low for Malta and Ireland as well as for Luxembourg, Finland, the UK, Slovenia and Sweden. This means that these EU member states have experienced relatively weaker long-term competitiveness in the global fruit and vegetable markets.

CONCLUSIONS

This paper contributes to the field of horticultural international trade. The paper applies advanced applied methodology to explore available data to investigate fruit and vegetable trade competition categories. The study can encourage additional investigation and comparisons of results for other countries and different time periods. The comparisons of the results show heterogeneity in the structure of competition categories and in the survival rates for the successful competition categories among the EU-27 member states. The empirical results have clearly confirmed the increasingly importance of Category 3 that trade surplus was achieved at higher

export price than import price. This finding is also consistent with specialization to produce and export higher value-added, relatively more expensive products, which are demanded by consumers on global markets with growth of real incomes. Increases in real incomes of consumers and changes of consumers' habits towards higher quality food in nutrition can cause further diversification of consumption and in structures of trade on global markets towards more valuable and diversified fruit and vegetable products.

A striking finding is, that heterogeneities in competition categories between the EU-27 member states were greater with higher degree of semi-processing or prepared and preserved fruit and vegetable products for final household consumption. While some differences can be explained by climatic conditions and other natural conditions for primary fruit and vegetable production, these results clearly suggest the importance of fruit and vegetable processing activities, advanced technology adoption and widespread innovation activities in the fruit and vegetable value chains. Advanced international marketing can also require development of storage facilities and innovations in marketing activities and in value chain management to achieve or maintain competitiveness on global markets.

The investigation of determinants of trade competition categories are issues for future research, including similarities and differences between the EU member states and with some other main competitors on global horticultural markets. Among other challenging issues there is also to study effects of external demands on global markets for fruit and vegetable products value chains. Fruit and vegetable markets have remained sensitive to different shocks and price volatilities in growing external demands on global markets.

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