# Revealed Comparative Advantage And Trade Competitiveness In Global Vegetable Products

Alieu Gibba

**Abstract:** The role of comparative advantage has great significance in guiding international trade and business. The closed economies which create artificial barriers to trade and commerce hardly benefit by pursuing such restrictive policies. The objective of the article was to evaluate the revealed comparative advantages (RCA) of global vegetable trade as well as the stability and duration of Balassa indices by employing Kaplan-Meier survival function and Markov transition probability matrices. Findings reveal that Netherlands, Spain, and Mexico were the major exporters of the selected vegetables in the period evaluated, together giving 54% of all products exported – the top10 countries, therefore, consisted 74% of concentration, dominated by the fresh or chilled tomatoes which accounts for more than 40% of trade among the [examined] products for all the periods analysed. The Balassa indices, nonetheless, were the highest for Spain and Thailand. Generally, comparative advantages seem to have weakened for most of the countries as demonstrated by the stability tests and mobility indices.

**Index Terms**: export, mobility, revealed comparative advantage, stability, trade, vegetable

## 1 INTRODUCTION

Why do nations trade? and How should a nation conducts its trade policy? are the two most central questions in international and agricultural economics. One of the most influential answers to the former question is the theory of comparative advantage and competitiveness. Its connection with economic progress and integration was extensively examined by [1] [2] [3]. It is an economic theory about the work gains from trade for individuals, firms, or nations that arise from differences in their factor endowments or technological progress. [4] reveals that the main tool of neoclassical trade theory is centered on comparative advantage driven by both sources of factor endowment or technological advancement. The author further emphasizes that in practice, factor endowment coexists with institutional differences and technological progress. The theory of comparative advantage provides an explanation of gains from trade and specialization, which is usually considered as a positive theory about the predictions of the directions and the terms of trade. [5] evaluates the measurement and theory of comparative advantage with a view to understanding trends in trade and agricultural production in OECD and developing countries. His study attempts to review the indicators of comparative advantage such as those connected with “direct resource cost”, “revealed comparative advantage”, “production cost”, and “trade liberalization”. [6] estimates export competitiveness and the analysis changing export specialization and economic conditions of Lithuania in the context of “economic integration” to the European Union (EU) and “globalization” in 2000 - 2007. The analysis of the export competitiveness, specialization, and pattern reveals that the total export of Lithuania largely depends on the export commodities of traditional industries due to the raw material resources and the level of technology. [7] measures the export competitiveness of Fiji from 1998 to 2002 with “trade-based indices” of the Revealed Comparative Symmetric Advantage (RSCA), Net Trade Revealed Comparative Advantage (NTRCA) index, and Revealed Comparative Advantage (RCA). His results of the RSCA and RCA reveal “competitive advantage” in some commodities. Moreover, the Net RCA index of his research reveals a weak specialization in most of Fiji’s export commodities. “Since exports are a primary source of foreign exchange for small and vulnerable economies, its long-term survival is dependent upon its ability to compete with exports of similar products from other countries in the international market” [7]. In consideration of traditional RCA measures along with dynamic comparative advantage, [8] evaluates the determinants of Kiwifruit export growth in New Zealand by adopting the revealed comparative advantage constructed by [9]. The outcome of their analysis reveals that New Zealand has a high level of comparative advantage and export enhancement in Kiwifruit during the last three decades. The size of the market, national and trading partners’ incomes, and seasonality were the key determinants of this success. [10] evaluated the effects of agri-food trade of the EU accession on the New Member States. Their findings reveal a significant effect on the intensity of the New Member States agri-food trade after the accession, despite the fact that there was a negative balance of trade. On the basis of empirical evidence, [11] assess the export competitiveness of fruits and vegetable products of the European Union (EU-27) in the world market. They concluded that majority of the EU-27 member states with the comparative advantages in vegetable and fruit products specialized in a particular segment or niche fruit and vegetable products. Similarly, [12] estimated production trends, export competitiveness and market efficiency of vegetables in India. The outcome of the study indicated an increase in the export quantity and that the Nominal Protection Coefficient (NPC) for all vegetables is less than 1; showing an impressive competitiveness in the global markets. The article evaluates revealed comparative advantages and export competitiveness in global vegetable trade. It therefore, contributes to the existing literature in several ways. First, it applies the theory of revealed comparative advantages on a specific vegetable product groups. Second, it examines products which are outstanding from a development economic perspective as vegetables are mainly produced and exported by developing countries. Finally, it aims to identify the factors lying behind comparative advantages and competitiveness. The structure of the article is organized as follows: Section 2 provides the methodology followed by section 3 which elucidates the findings and discussion. Conclusions are provided in section 4.

- *Alieu Gibba is currently pursuing a Ph.D. degree program in Management and Business Administration Sciences – Specializing in Agricultural Trade Competitiveness, at Szent Istvan University, Hungary. E-mail: agibba1@gmail.com*

## 2. MATERIALS AND METHODS

The article is based on the seminal work of [9] in terms of scientific methods. Balassa's measurement of comparative trade advantage is calculated by different index numbers based on the notion of Ricardian trade theory. The original index of revealed comparative advantage defined as follows [9]:

$$B_{ij}=RCA_{ij}=\left(\frac{X_{ij}}{X_{it}}\right)\bigg/\left(\frac{X_{nj}}{X_{nt}}\right) \quad (1)$$

Where, X represents export, i indicates a given country, j is a given product, t is a group of products and n is a group of countries. It follows that a revealed comparative advantage (or disadvantage) index of exports can be calculated by comparing a given country's export share of its total exports with the export share in total exports of a reference group of countries. If the value of Balassa index is greater than 1 [i.e, B > 1], a given country has a comparative advantage compared to the reference countries or, on the other hand, a revealed comparative disadvantage if the Balassa index is < 1 [i.e, B < 1]. The source of data is global vegetable exports at HS6 level for 1996-2015. The Balassa-index has been criticised because it usually ignores the different effects of agricultural policies and shows asymmetric values. Trade structure is deformed by different state interventions and trade limitations while the asymmetric value of the Balassa index reveals that it extends from one to infinity if a country enjoys a comparative advantage, but in the case of comparative disadvantage, it varies between zero and one, which overestimates a sector's relative weight. Moreover, a number of specifications of the revealed comparative advantage (RCA) index has been evaluated by the following studies: [13]; [14]; [15]; [16]; [17]; [18]; [19]; [20]; [21]; and [22]. The article also checks the stability and duration of the RCA index in two steps using STATA software. First, Markov transition probability matrices are calculated and then summarized by using the mobility index, evaluating the mobility across countries and time. Second, following [11], a survival function S(t) can be estimated for by the using the non-parametric Kaplan–Meier product limit estimator, which pertains to the product level distribution analysis of the RSCA index. Following [11], a sample contains n independent observations denoted (ti; ci), where i = 1, 2 , . . . , n, and ti is the survival time, while ci is the censoring indicator variable C (taking on a value of 1 if a failure occurred, and 0 otherwise) of observation i. Moreover, it is assumed that there are m < n recorded times of failure. Then, we denote the rank-ordered survival times as t(1) < t(2) < … < t(m). Let nj indicate the number of subjects at risk of failing at t(j) and let dj denote the number of observed failures. The Kaplan–Meier estimator of the survival function is then (with the convention that ˆS(t) = 1 if t < t(1)):

$$\hat{S}(t)=\prod_{t(i)<t}\frac{n_j-d_j}{n_j} \quad (2)$$

The article employs global vegetable trade data of World Bank (2016) World Integrated Trade Solution database at HS-6 level between 1996 and 2015 with these product codes included: 070110, 070200, 070310, 070320, 070511, 070610, 070700, 070970, 071410, and 071420. The article excludes imports analysis and concentrated on exports of the revealed comparative advantage index (B or RCA index).

## 3. FINDINGS AND DISCUSSION

It has been calculatedly evidenced that Netherlands, Spain, and Mexico were the most important exporters of vegetables in the periods estimated, accounting for 45% of all the exported products (Table 2). Consequently, the top 10 countries displayed a concentration of 74% (Table 1). Furthermore, between the time periods 1996-2000, 2001–2005, 2006–2010, and 2011–2015, Netherlands, Spain, Mexico, China, Thailand, United States, France, Canada, Belgium, and Italy, reproduced 80%, 78%, 71%, and 72%, of global total exports of vegetable products respectively.

***Table 1.*** *Top 10 world exporters of vegetables, 1996-2015, by country (in 1000 US$)*

| **Country** | **1996-2000** | **2001-2005** | **2006-2010** | **2011-2015** | **1996-2015** |
|---|---|---|---|---|---|
| Netherlands | 1535724 | 1888512 | 3174519 | 3840328 | 2609771 |
| Spain | 1284069 | 1740482 | 2374535 | 2659727 | 2014703 |
| Mexico | 896173 | 1265748 | 1919282 | 2672894 | 1688524 |
| China | 151708 | 535129 | 1534642 | 2451297 | 1168194 |
| Thailand | 339253 | 289169 | 598118 | 1309484 | 634006 |
| United States | 421222 | 534113 | 734013 | 806357 | 623926 |
| France | 245782 | 297004 | 539174 | 663467 | 436357 |
| Canada | 187023 | 359057 | 476873 | 612903 | 408964 |
| Belgium | 132804 | 411362 | 489412 | 501721 | 383825 |
| Italy | 259163 | 304457 | 439916 | 457663 | 365300 |
| **Concentration** | **80%** | **78%** | **71%** | **72%** | **74%** |

***Note:*** *Countries are listed in decreasing order based on their 1996-2015 averages.*
***Source:*** *Own composition based on WITS (2016) data*

***Table 2:*** *TOP 10 vegetable exporters in the world, 2006-2015, percentage*

| **Country** | **2006-2010** | **Country** | **2011-2015** | **Country** | **1996-2015** |
|---|---|---|---|---|---|
| Netherlands | 18% | Netherlands | 17% | Netherlands | 19% |
| Spain | 14% | Spain | 12% | Spain | 14% |
| Mexico | 11% | Mexico | 12% | Mexico | 12% |
| China | 9% | China | 11% | China | 8% |
| Thailand | 3% | Thailand | 6% | Thailand | 5% |
| United States | 4% | United States | 4% | United States | 4% |
| France | 3% | France | 3% | France | 3% |
| Canada | 3% | Canada | 3% | Canada | 3% |
| Belgium | 3% | Belgium | 2% | Belgium | 3% |
| Italy | 3% | Italy | 2% | Italy | 3% |
| Top10 Total | 71% | Top10 Total | 72% | Top10 Total | 74% |

***Source:*** *Own composition based on WITS (2016) data*

Regarding the global vegetable imports, United States, France, Canada, China, Belgium, Netherlands, and Italy, were among the top 10 major buyers of the selected vegetables globally between the periods 1996 and 2015 (Table 3). These countries were also among the top 10 major sellers of world vegetables due to the re-exportation of value added products as a result of technological advantage. It is important to note that the concentration of the top 10 world importers of vegetables were 67%, 66%, 62%, 63%, and 64% in the evaluated sub-periods respectively (Table 3).

***Table 3.*** *Top 10 world importers of vegetables, 1996-2015, by country (in 1000 US$)*

| **Country** | **1996-2000** | **2001-2005** | **2006-2010** | **2011-2015** | **1996-2015** |
|---|---|---|---|---|---|
| United States | 1211849 | 1677579 | 2462334 | 3401822 | 2188396 |
| Germany | 1400279 | 1511544 | 2242623 | 2475790 | 1907559 |
| United Kingdom | 649717 | 933930 | 1362241 | 1340033 | 1071481 |
| Russian Fed. | 188740 | 241138 | 960725 | 1529606 | 730052 |
| France | 482568 | 594712 | 891560 | 943806 | 728162 |
| China | 26764 | 251557 | 753509 | 1846773 | 719651 |
| Netherlands | 536447 | 439546 | 660928 | 821794 | 614679 |
| Canada | 341049 | 482227 | 720888 | 869916 | 603520 |
| Belgium | 87849 | 265860 | 380278 | 455851 | 297460 |
| Italy | 126619 | 210686 | 331478 | 371392 | 260044 |
| **Concentration** | **67%** | **66%** | **62%** | **63%** | **64%** |

***Note:*** *Countries are listed in decreasing order based on their 1996-2015 averages.*
***Source:*** *Own composition based on WITS (2016) data*

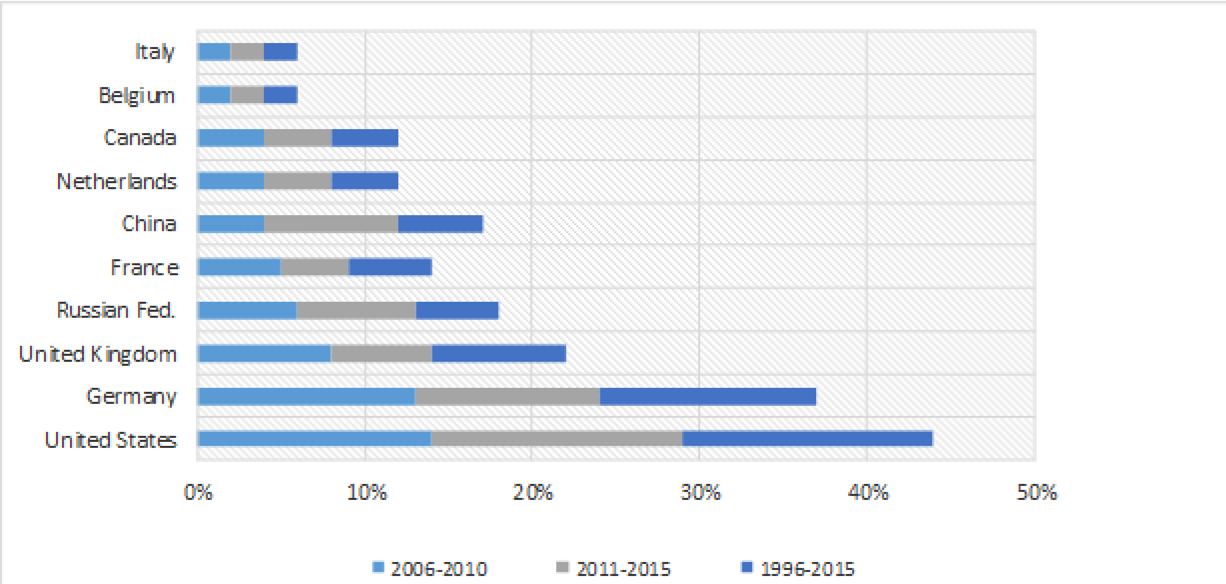


***Figure 1:*** *TOP 10 vegetable importers in the world, 2006-2015, percentage*
***Source:*** *Own calculations based on WITS (2016) data*

As for the vegetables by product, the most traded vegetable type is the fresh or chilled tomatoes (070200) which accounts for more than 40% of trade among the selected and examined products, followed by the fresh or chilled onions and shallots (070310) which represents 12% of the total vegetable trade (Figure 2).

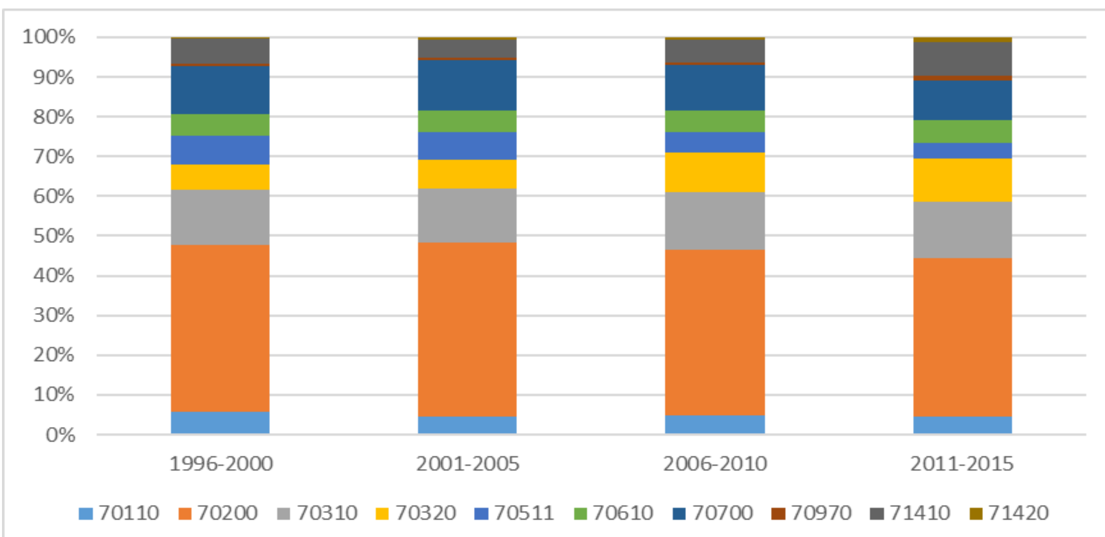


***Figure 2.*** *Global vegetable exports, 1996-2015, by product (in 1000 US$)*
***Source:*** *Own calculations based on WITS (2016) data*

**Note:** 070110 -- Seed potatoes; 070200 -- Tomatoes, fresh or chilled; 070310 -- Onions and shallots, fresh or chilled; 070320 -- Garlic, fresh or chilled; 070511 -- Cabbage lettuce, fresh or chilled; 070610 -- Carrots and turnips, fresh or chilled; 070700 -- Cucumbers and gherkins, fresh or chilled; 070970 -- Spinach, fresh or chilled; 071410 -- Manioc, fresh or dried; 071420 -- Sweet potatoes, fresh or dried.

COMPARATIVE ADVANTAGE– **patterns and stability**

With the calculation of Balassa indices, the specialisation of countries in the global vegetable trade becomes manifested. It is obvious that Spain had the highest comparative advantage (Table 4) and Thailand with the most stable comparative advantage (Figure 2) in all the examined periods among the most important vegetable exporters in the world, suggesting high potentials for competitiveness. Canada, Belgium, China, and Italy also had relatively high comparative advantages in global vegetable exports, while similar numbers for other countries examined have varied significantly. It is crucial to note that Netherlands, Spain, and Mexico, despite being three of the largest global vegetable exporters, have generally decreasing and low comparative advantages compared to Thailand.

***Table 4.*** *Balassa indices for top 10 global vegetable exporters, 1996-2015*

| Country | 1996-2000 | 2001-2005 | 2006-2010 | 2011-2015 | 1996-2015 |
|---|---|---|---|---|---|
| Netherlands | 3.91 | 3.39 | 3.59 | 4.11 | 3.75 |
| Spain | 5.02 | 5.31 | 5.24 | 5.76 | 5.33 |
| Mexico | 2.46 | 2.32 | 2.53 | 2.49 | 2.45 |
| China | 1.01 | 1.14 | 0.85 | 0.72 | 0.93 |
| Thailand | 5.89 | 5.17 | 4.60 | 4.32 | 4.99 |
| United States | 0.82 | 1.04 | 1.20 | 1.12 | 1.04 |
| France | 0.66 | 0.65 | 0.71 | 0.62 | 0.66 |
| Canada | 0.49 | 0.63 | 0.63 | 0.80 | 0.64 |
| Belgium | 0.95 | 0.84 | 0.69 | 0.64 | 0.75 |
| Italy | 1.02 | 0.74 | 0.75 | 0.76 | 0.82 |

***Source:*** *Own calculations based on WITS (2016) data*

The degree of mobility in the RCA indices is measured by using the mobility index based on the Markov transition probability matrices (Figure 3). The findings demonstrate a relatively low mobility of the revealed comparative advantage (RCA) index in global vegetable trade for Thailand, putting forward stable competitive potentials. It is obvious that more than 72% of the various vegetable product groups with a comparative advantage remained pertinacious for Canada, Belgium, Italy, and China, although the lowest mobility measures appertain to France, United States, Mexico, Netherlands, and Spain

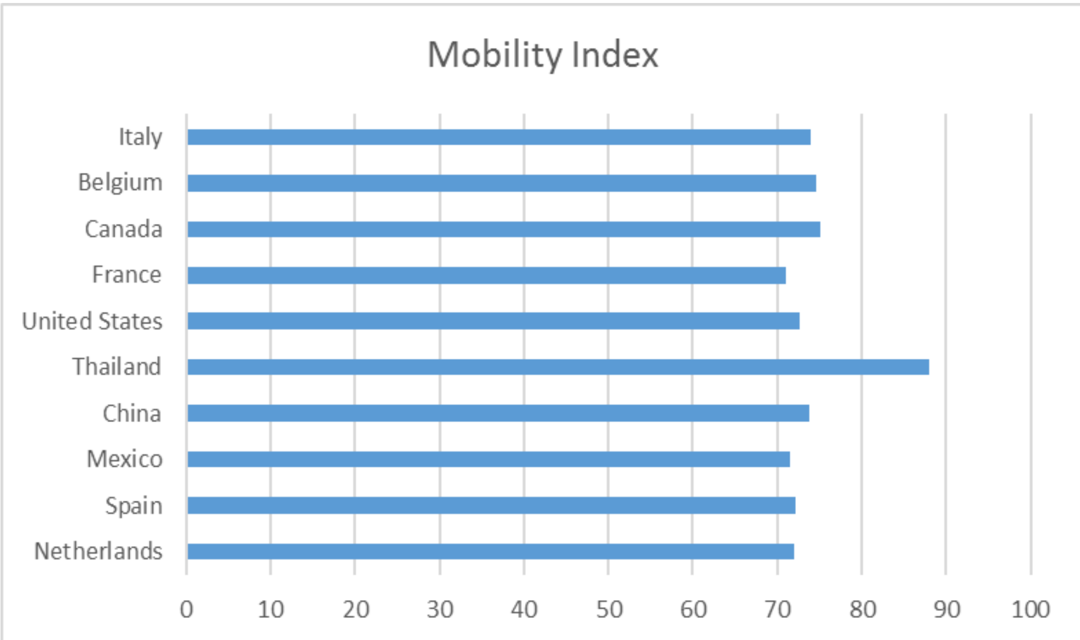


***Figure 3.*** *The mobility indices of RCA, 1996-2015, by country, percentage*
***Source:*** *Own composition based on WITS (2016) data*

Considering the duration of revealed comparative advantages in the world vegetable exports, the non-parametric Kaplan–Meier product limit estimator was analysed. As elucidated in the methodology section, equation 2 was applied on the panel dataset and results revealed that in general the survival times are not continual over the period evaluated (Table 5). Survival chances of 97% at the commencement of the period drastically reduced to 6% by the end of the period, indicating that there exists stiff competition in global vegetable trade. Results differ by various product groups, proposing that the highest survival periods exist for fresh or chilled carrots and turnips, giving the broad majority of world vegetable trade.

***Table 5:*** *Kaplan-Meier survival rates for Balassa indices and tests for equality of survival functions in world vegetable trade, by product, 1996–2015*

| Year | Survivor function | 70110 | 70200 | 70310 | 70320 | 70511 | 70610 | 70700 | 70970 | 71410 | 71420 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.9696 | 0.9659 | 0.9677 | 0.9677 | 0.977 | 0.9674 | 0.977 | 0.9677 | 0.9721 | 0.9612 | 0.9718 |
| 1997 | 0.9387 | 0.9312 | 0.935 | 0.935 | 0.9486 | 0.9346 | 0.9628 | 0.935 | 0.9436 | 0.9221 | 0.9383 |
| 1998 | 0.9073 | 0.8959 | 0.9018 | 0.9018 | 0.9197 | 0.906 | 0.9433 | 0.9018 | 0.9146 | 0.878 | 0.9091 |
| 1999 | 0.8729 | 0.8601 | 0.868 | 0.868 | 0.8853 | 0.8672 | 0.918 | 0.8632 | 0.8849 | 0.8385 | 0.8746 |
| 2000 | 0.8367 | 0.8236 | 0.8335 | 0.8335 | 0.8451 | 0.8327 | 0.8919 | 0.824 | 0.8493 | 0.7986 | 0.8344 |
| 2001 | 0.8002 | 0.7864 | 0.7982 | 0.7982 | 0.8041 | 0.8024 | 0.8703 | 0.784 | 0.8129 | 0.7531 | 0.7937 |
| 2002 | 0.7619 | 0.7485 | 0.7619 | 0.7567 | 0.7623 | 0.766 | 0.8421 | 0.7433 | 0.7754 | 0.7073 | 0.7573 |
| 2003 | 0.7236 | 0.7041 | 0.7299 | 0.7144 | 0.7144 | 0.7285 | 0.8185 | 0.7017 | 0.7424 | 0.666 | 0.72 |
| 2004 | 0.6836 | 0.6587 | 0.6967 | 0.6711 | 0.6656 | 0.6898 | 0.7937 | 0.6592 | 0.7025 | 0.6241 | 0.6815 |
| 2005 | 0.6436 | 0.6179 | 0.6622 | 0.6267 | 0.6161 | 0.6499 | 0.7675 | 0.6156 | 0.6729 | 0.5761 | 0.6418 |
| 2006 | 0.6016 | 0.5759 | 0.6261 | 0.5811 | 0.5657 | 0.6086 | 0.7465 | 0.5764 | 0.6359 | 0.5222 | 0.5947 |
| 2007 | 0.5592 | 0.5325 | 0.5818 | 0.5342 | 0.5143 | 0.5717 | 0.7239 | 0.5357 | 0.5974 | 0.4733 | 0.5522 |
| 2008 | 0.5137 | 0.4812 | 0.5355 | 0.4856 | 0.4617 | 0.5327 | 0.6992 | 0.4931 | 0.5566 | 0.4231 | 0.502 |
| 2009 | 0.4639 | 0.4285 | 0.4868 | 0.4351 | 0.4077 | 0.4843 | 0.6629 | 0.4482 | 0.5133 | 0.3717 | 0.4433 |
| 2010 | 0.4142 | 0.3732 | 0.4499 | 0.3824 | 0.3521 | 0.4476 | 0.6227 | 0.4007 | 0.4666 | 0.3136 | 0.3896 |
| 2011 | 0.3609 | 0.3146 | 0.4009 | 0.3268 | 0.2945 | 0.4069 | 0.5888 | 0.3497 | 0.4072 | 0.2544 | 0.34 |
| 82012 | 0.3052 | 0.2596 | 0.3553 | 0.2674 | 0.2343 | 0.3607 | 0.5486 | 0.2941 | 0.3517 | 0.1999 | 0.2782 |
| 2013 | 0.2397 | 0.199 | 0.2907 | 0.2025 | 0.1704 | 0.306 | 0.4821 | 0.2317 | 0.2877 | 0.1374 | 0.2107 |
| 2014 | 0.1646 | 0.1294 | 0.2246 | 0.1289 | 0.1007 | 0.2365 | 0.4164 | 0.158 | 0.1962 | 0.0785 | 0.1341 |
| 2015 | 0.0604 | 0.0388 | 0.1225 | 0.0352 | 0.0183 | 0.129 | 0.265 | 0.0574 | 0.0892 | 0.0071 | 0.0366 |
| Log-rank test | 0.0000 | | | | | | | | | | |
| Wilcoxon test | 0.0000 | | | | | | | | | | |

***Source:*** *Own calculations based on WITS (2016) data*

The equality of the survival functions across the top 10 countries can be evaluated using two non-parametric tests (Wilcoxon and Log-rank tests). Results of the tests indicate that the hypothesis of equality across survivor functions can be rejected at the 1% level of significance, meaning that similarities in the duration of comparative advantage across most important global vegetable exporters are absent (Table 6).

***Table 6:*** *Kaplan-Meier survival rates for Balassa indices and tests for equality of survival functions in world vegetable trade, by country, 1996–2015*

| Year | Survivor function | Netherlands | Spain | Mexico | China | Thailand | United States | France | Canada | Belgium | Italy |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.969 | 0.99 | 0.985 | 0.979 | 0.959 | 0.958 | 0.96 | 0.965 | 0.957 | 1.0845 | 0.965 |
| 1997 | 0.938 | 0.974 | 0.969 | 0.9574 | 0.9192 | 0.910 | 0.9297 | 0.9244 | 0.92 | 1.0426 | 0.929 |
| 1998 | 0.907 | 0.963 | 0.953 | 0.929 | 0.878 | 0.873 | 0.898 | 0.883 | 0.876 | 1.0007 | 0.888 |
| 1999 | 0.872 | 0.963 | 0.936 | 0.900 | 0.841 | 0.831 | 0.861 | 0.841 | 0.838 | 0.958 | 0.846 |
| 2000 | 0.836 | 0.945 | 0.918 | 0.870 | 0.804 | 0.788 | 0.829 | 0.799 | 0.799 | 0.916 | 0.804 |
| 2001 | 0.800 | 0.926 | 0.900 | 0.852 | 0.766 | 0.745 | 0.796 | 0.757 | 0.755 | 0.874 | 0.761 |
| 2002 | 0.761 | 0.906 | 0.881 | 0.826 | 0.722 | 0.696 | 0.762 | 0.719 | 0.705 | 0.836 | 0.717 |
| 2003 | 0.723 | 0.885 | 0.860 | 0.785 | 0.683 | 0.646 | 0.726 | 0.680 | 0.671 | 0.798 | 0.673 |
| 2004 | 0.6836 | 0.8636 | 0.846 | 0.743 | 0.64 | 0.597 | 0.690 | 0.629 | 0.636 | 0.758 | 0.628 |
| 2005 | 0.643 | 0.840 | 0.823 | 0.707 | 0.602 | 0.552 | 0.652 | 0.589 | 0.600 | 0.709 | 0.582 |
| 2006 | 0.601 | 0.814 | 0.798 | 0.661 | 0.553 | 0.512 | 0.613 | 0.548 | 0.563 | 0.660 | 0.536 |
| 2007 | 0.559 | 0.805 | 0.772 | 0.637 | 0.503 | 0.461 | 0.572 | 0.505 | 0.519 | 0.608 | 0.488 |
| 2008 | 0.5137 | 0.7958 | 0.743 | 0.603 | 0.452 | 0.409 | 0.529 | 0.461 | 0.472 | 0.547 | 0.439 |
| 2009 | 0.463 | 0.761 | 0.711 | 0.557 | 0.406 | 0.357 | 0.484 | 0.401 | 0.430 | 0.485 | 0.389 |
| 2010 | 0.414 | 0.736 | 0.675 | 0.508 | 0.352 | 0.303 | 0.436 | 0.348 | 0.386 | 0.428 | 0.350 |
| 2011 | 0.360 | 0.706 | 0.648 | 0.452 | 0.296 | 0.248 | 0.383 | 0.292 | 0.338 | 0.360 | 0.301 |
| 2012 | 0.3052 | 0.6715 | 0.616 | 0.4025 | 0.2369 | 0.1928 | 0.3261 | 0.2414 | 0.2935 | 0.2971 | 0.248 |
| 2013 | 0.2397 | 0.6267 | 0.575 | 0.3577 | 0.173 | 0.135 | 0.25 | 0.185 | 0.2227 | 0.2179 | 0.190 |
| 2014 | 0.1646 | 0.564 | 0.517 | 0.2782 | 0.104 | 0.0742 | 0.175 | 0.111 | 0.1641 | 0.1416 | 0.123 |
| 2015 | 0.0604 | 0.4512 | 0.414 | 0.1855 | 0.020 | 0.0074 | 0.052 | 0.022 | 0.0656 | 0.0425 | 0.037 |

***Source:*** *Own calculations based on WITS (2016) data*

Results of survival functions of the examined countries differed, proposing that the highest survival periods exist for Netherlands, giving the broad majority of world vegetable trade, while the lowest exist for Thailand.

## 4. CONCLUDING REMARKS

The article evaluates the revealed comparative advantage and competitiveness of vegetables in world trade, addressing special attention to its stability and duration. It has reached several conclusions. First, by assessing the characteristics of global vegetable trade, it has been observed that Netherlands, Spain, and Mexico were the major exporters of the selected vegetables in the period evaluated, together giving 54% of all products exported – the top10 countries, therefore, consisted 74% of concentration. On the contrary, The United States, Germany and The United Kingdom were the main importers, mainly for re-exporting and domestic consumption purposes. Second, the analysis has clarified that the most traded vegetable type is the fresh or chilled tomatoes (070200) which accounts for more than 40% of trade among the selected and examined products for all the periods analyzed, followed by the fresh or chilled onions and shallots (070310) which represents 15% of the total vegetable trade. Third, the estimation of the Balassa indices indicated that Spain and Thailand had the highest comparative advantages in all the examined periods among the most important vegetable exporters globally. However, the findings demonstrate a relatively low mobility of the RCA index in global vegetable trade for Thailand, suggesting stable competitive potentials. Lastly, according to survival tests, survival chances of 97% at the commencement of the period reduced to 6% by the end of the period, indicating that fierce competition exists in world [examined] vegetable trade.

## 5. REFERENCES


[1] Balassa, B. (1971). Trade policies in developing countries. The American Economic Review 61(2), 178-187.

[2] Balassa, B. (1975). European economic integration. Vol. 89. North-Holland.

[3] Balassa, B. (1988). The lessons of East Asian development: An overview. Economic Development and Cultural Change 36(3), S273-S290.

[4] Costinot, A. (2009). An elementary theory of comparative advantage (No. w14645). National Bureau of Economic Research.

[5] Goldin, I. (1990). Comparative advantage: Theory and application to developing country agriculture. OECD.

[6] Saboniene, A. (2015). Lithuanian export competitiveness: comparison with other Baltic States. Engineering Economics, 62(2).

[7] Prasad, R. N. (2004). Fiji's export competitiveness: a comparison with selected small island developing states. Economics Department, Reserve Bank of Fiji.

[8] Bano, S., Scrimgeour, F. (2012). The export growth and revealed comparative advantage of the New Zealand kiwifruit industry. International Business Research, 5(2), 73.

[9] Balassa, B. (1965). Trade liberalisation and "revealed" comparative advantage1. The Manchester School, 33(2), 99-123.

[10] Toeroek, A., Jambor, A. (2013). Agri-food trade of the New Member States since the EU accession. Agricultural Economics–Czech, 59(3), 101-112.

[11] Bojnec, Š., Fertő, I. (2016). Export Competitiveness of the European Union in Fruit and Vegetable Products on Global Markets. Agr. Econ.–Czech.

[12] Dastagiri, M. B., Chand, R., Immanuelraj, T. K., Hanumanthaiah, C. V., Paramsivam, P., Sidhu, R. S., Kumar, B. G. (2013). Indian vegetables: production trends, marketing efficiency and export competitiveness. American Journal of Agriculture and Forestry, 1(1), 1-11.

[13] Leromain, E., Orefice, G. (2014). New revealed comparative advantage index: Dataset and empirical distribution. International Economics, 139, 48-70.

[14] Laursen, K. (2015). Revealed comparative advantage and the alternatives as measures of international specialization. Eurasian Business Review, 5(1), 99-115. ISO 690.

[15] Brakman, S., Garretsen, H., Van Marrewijk, C., & Van Witteloostuijn, A. (2013). Cross- Border Merger & Acquisition Activity and Revealed Comparative Advantage in Manufacturing Industries. Journal of Economics & Management Strategy, 22(1), 28-57.

[16] Levchenko, A. A., & Zhang, J. (2016). The evolution of comparative advantage: Measurement and welfare implications. Journal of Monetary Economics, 78, 96-111.

[17] Jambor, A. (2013). Comparative advantages and specialisation of the Visegrad countries agri-food trade. Acta Oeconomica et Informatica, 16(1), 22-34.

[18] Sinanana, D., & Hoseinb, R. (2012). Transition probability matrices and revealed comparative advantage persistence in a small hydrocarbon-based economy. Transition, 34(1/2), 16-29.

[19] Ischukova, N. (2013). Revealed comparative advantage of Russian agricultural exports. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 61(4), 941-952.

[20] Oelgemöller, J. (2013). Revealed comparative advantages in Greece, Ireland, Portugal and spain. Intereconomics, 48(4), 243-253.

[21] Supongpan Kuldilok, K., Dawson, P. J., & Lingard, J. (2013). The export competitiveness of the tuna industry in Thailand. British Food Journal, 115(3), 328-341.

[22] Ignjatijević, S., Milojević, I., Cvijanović, G., & Jandrić, M.

(2015). Balance of Comparative Advantages in the Processed Food Sector of the Danube Countries. Sustainability, 7(6), 6976-6993. ISO 690.