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PAPER

The comparative Advantage in the main exporting countries, flower and ornamental plant sector

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Abstract The flowers and ornamental plants sector has been playing a remarkable role within the agricultural sector both in productivity and employment terms. The economic importance of ornamental plants has been increasing in many countries, and international demand has rapidly expanded. The Ornamental plants are products that can be produced in most areas of Iran and are even competitive in the global market and have the potential for exchange earnings of export, but it has a little share in export. The aim of the present research is to investigate the comparative advantage of countries which export flowers and ornamental plants. For this purpose, the revealed comparative advantage index, Symmetric revealed comparative advantage and new revealed comparative index have been used during the period of 2007–2015. The main findings revealed that Ecuador, Colombia, Netherlands and Kenya have the highest exporting comparative advantage. Also, the values for the degree of trade specialization indicate that the pattern of trade specialization is gradually decreasing in the most exporting countries.

Keywords: comparative advantage; flower and ornamental plants; New revealed comparative; trade specialization; Galtonian regression

Jel Classification: F140; Q170

1. Introduction

Many advantages of flowers and ornamental plants (FOPs) are not sufficiently recognized, so for most people flowers and other plants are only a part of their subconscious, something that is in the background and that has no significant role in everyday life. The FOP industry is extremely complex and dynamic, and it represents a vital segment in the economies of a large number of countries and the global economy

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(Vukajlovic et al. 2017). In the last decades, the production of FOPs has been changed by factors such as the globalization of markets and the economic development of societies. The globalization has led to an increased competition due to the entry of new competitors into the market of FOPs. This is specially the case in developing countries, where favorable environmental conditions, the abundance of natural resources, and the availability of low-cost labor provide apparent competitive advantages (Schimmenti et al. 2010).

The FOPs sector is very diverse and includes the production of floral crops such as cut flowers and cut foliage, flower bulbs, potted flowering as well as foliage plants and bedding plants.

The floriculture world trade is characterized by a high degree of concentration by product and sources. Developed countries in Europe, America, and Asia account for more than 90% of demand. International trade in floriculture, is organized along the regional lines to a large extent. Asia-Pacific countries are the main suppliers to Japan and Hong Kong. African, Middle Eastern, and other European countries are the principal suppliers to Europe's main markets, Colombia and Ecuador have dominant markets in USA (CBI Ministry of Foreign Affairs, 2016).

The growing trend in FOPs market is indicated in a report. According to statistical data, the global exports of cut flowers, cut foliage, living plants and flower bulbs had grown from US$ 8.5 billion in 2001 to US$ 18 billion in 2010 and US$ 21.5 billion in 2014, this value is decreased to US$ 18.8 billion in 2015, it increased US$ 18.9 billion in 2016, and it reached to US$ 28.4 billion in 2017. Reaching this value has an annual growth rate of 57% from 2010 to 2017 (Unctad, 2016; UN comtrade, 2018)

While worldwide consumption has been on the rise, consumers have also become more refined in demanding new products. To meet this growing and changing demand, production has continued to move from countries that had been traditionally consumers and growers, such as the Netherlands, to other relatively new producing countries such as Colombia, Ecuador, Kenya, and Ethiopia. The Netherlands has long been at the center of cut flower production in the European floral market, this country continues to be the largest exporter of cut flowers in the world market, having a 43% share of the global market, which in turn yielded a revenue approximately equivalent to $12.6 billion USD. Colombia occupies 15% of the global market share in the cut flower export sector, generating a revenue of nearly $3.9 billion dollar for the country annually. 11% of the global market share of cut flowers is held by the Kenyan cut flower industry. The cut flower industry in Ecuador and Ethiopia had grown substantially over the past decade, with the country now occupying a 9% share of the global market in terms of cut flower export values. Today, 1% of the global market share of cut flowers is held by Malaysia, Germany, Belgium, Italy and China. Global floral production value is estimated at US$ 55 billion. Tree nursery—the production of trees, shrubs and other hardy plants—is worth another US$ 35 billion. Although cut flowers, cut foliage and flower bulbs are traded globally, mainly from south to north, more bulky live plants, such as potted plants and nursery products, are mainly traded regionally (UN- Comtrade, 2016).The competitiveness is one of the most used word in economics, containing many kinds

of different interpretations. One strand of the literature combines international trade theories with those of macro level competitiveness and argues that competitiveness of nations can be interpreted and measures via trade based indices. Balassa (1965) was one of the early supporters of this theory, elaborating his famous index of revealed comparative advantages (RCA). Since this seminal work, a vast amount of literature is dedicated to the analyses of revealed comparative advantages of global trade (jambor et al., 2017).

Iran is a large country with climatic diverse that twelve types of which are in different areas of Iran out of fourteen ones as it has been enjoying the natural talent for growing kinds of herbs such as flowers and ornamental plants. Despite these favorable natural conditions, in recent years, the potentials of this sector in the country are not used correctly, and this industry was not able to find properly its true role in non-oil export and creation of the value added. (Mousavi, 2015)

The literature on identifying FOPs market is very poor, the studies have dealt with the economics of different aspects of floriculture. The opportunities for the development of this economic area are in a way that would enable the people engaged in this activity to make a good living for themselves (Khonphian et al., 2009; Adeniyi, 2015; Hussain et al., 2016). The evidence internationally (especially from Chile and Colombia and also from Kenya) suggests that successful integration into global horticultural value chains depends on a handful of 'export superstars' (Moran, 2018). The different facts of trade relations between Brazil and Morocco is analyzed by the RCA index and assesses the potential for deeper trade integration between these two key players in the southern Atlantic. Floriculture is distinguished by its economic and social importance in Brazil (Silva et al., 2015) Floriculture is the latest addition to the commercial economic sector of agriculture and it was developed in all of its potentials. Generally, the business of growing traditional flowers (typical for certain countries), as well as untraditional flowers and dried flowers is referred to as the floriculture industry, which encompasses the production, processing and marketing of all types of flowers (Kadam, 2012). In the context of floriculture, as a branch of agriculture, its difference from traditional husbandry is emphasized, not only due to the increased sales revenue, but also because of the flowers that are more present in daily life, which leads to the opportunities for having floriculture as a source of income (Peter, 2010). Floriculture serves the purpose of raising income and reducing poverty in the developing countries. In certain labor - intensive economies which are not developed, the production of cut flowers is the main source of their comparative advantages (Labaste, 2005). That is further supported by the fact that the demand for flowers is increasing, both in the developed and in the developing countries, so the growing of different types of flowers has the capacity to enhance economic benefits, which include different aspects of floriculture, from production and sales to marketing (Manzoor et al, 2001).

The comparative advantage of flower and plant production (roses, tuberose and Gladiolus) in Isfahan, Tehran and central provinces were studied (Forghani and Kiani abar, 2005). The RCA index of Iran's cut-branch flower and compare with the major exporting countries has been calculated. The results showed that during the study

period, Netherlands, Kenya, Ecuador, and Colombia have comparative advantage in flower export and Italy, Spain, Belgium, Thailand, United States, Germany, Great and Iran have not comparative advantage in flower export (shoukatfadaei et al, 2015).
Despite the flower importance as the valuable products, however, the number of papers dealing with New RCA index are relatively small and this could be an innovation in the results of this article.

Due to the increasing importance of FOPs trade in last decades, the main motivation of the present study is the lack of knowledge on the advantages of FOPs export markets that can be a proper guide for marketers and countries investing on its export.

2. Materials and method

2.1 Revealed comparative advantage (RCA)

The relative importance of an industry in the total trade is usually measured by the revealed comparative advantage (RCA) or Balassa index (Ferto and Hubbard, 2003; Latruffe, 2010; Wijnands et al., 2008). The Revealed comparative advantage index was used to determine the most important destinations and product groups for the region's export trade. It is used in international economics to calculate the comparative advantage or disadvantage of a certain country in a certain class of goods or services.

If it is related to the export, it measures the export share of a country in the total world export of a given product relative to the country's total export share in the world export of all products. The most well-known index analyzing export competitiveness of nations is RCA, calculating the proportion of a country's share of exports for a single commodity to the exports of all commodities and the similar share for a group of selected countries, expressed by Balassa (1965) is as follows:

$$RCA = \frac{X_{ij} / X_{it}}{X_{nj} / X_{nt}} \tag{1}$$

Where, X means export, i indicates a given country, j is a given product, t is a group of products and n is the group of selected countries. Hence, a revealed comparative advantage (or disadvantage) index of exports can be calculated by comparing a given country's export share by its total exports, with the export share by total exports of a reference group of countries. If RCA is > 1, a given country has a comparative advantage compared to the reference countries, or in contrast, a revealed comparative disadvantage if RCA < 1.

2.2 Symmetric revealed comparative advantage (SRCA)

The benefit of comparative advantage index is that it takes into consideration the intrinsic advantage of a particular export commodity as well as consistency with changes. However, one of the main disadvantages of RCA index is its wide range in a way that it is too wide to determine the degree of comparative advantage properly. In order to treat the asymmetric value problem of the Balassa-index, Dalum et al. (1998) transformed B index as follows, thereby creating the Symmetric Revealed Comparative Advantage (SRCA) index is:

$$SRCA_{ij} = \frac{RCA_{ij} - 1}{RCA_{ij} + 1} \tag{2}$$

The SRCA takes values between -1 and 1, with values between 0 and 1 indicating a comparative export advantage and values between −1 and 0 a comparative export disadvantage. Since the SRCA distribution is symmetric around zero, potential bias is avoided (Dalum et al, 1998).

Next, we analyze the stability of the SRCA index, from the years 2009 to 2015, inclusive, using a regression analysis of the dependent variable SRCA index at time t (for sector i in country j) against the lagged operator of SRCA at the previous time t−1. The parameters α and β are standard linear regression estimators, and ε is a residual term. The stability analysis is based on Galtonian regression model presented by Hart & Prais (1956) and later developed by Cantwell (1989) in the context of specialization. The equation is the following:

$$SRCA_{ij}^{t} = \alpha_i + \beta_j SRCA_{ij}^{t-1} + \varepsilon_{ij} \tag{3}$$

If β=1, the unchanged pattern of SRCA between periods t−1 and t, indicates no change in the overall degree of specialization in the export of a sector i. If β>1, which is also called β divergence, the existing specialization is strengthened, which means a low level of specialization in the initial period leads to less specialization in the future. If 0<β<1 (convergence) is the case, sectors with initial low SRCAs increase over time on average, while the sectors with initial high SRCAs decrease their values. Moreover, when β=R (The sign R represents the correlation coefficient of the regression) the pattern of a given distribution is unchanged. When β>R, then the degree of specialization grows, leading to divergence. If β<R, the degree of specialization falls, i.e., more convergence develops (Bojnec and Fert, 2008).

2.3 New index of revealed comparative advantage (New RCA)

Costinot et al. (2012) provides a theoretical micro-foundation for the Ricardian model of trade. They build a structural Ricarian model with multiple countries and industries, one factor of production (labor), allowing for intra-industry heterogeneity (Eaton and Kortum 2002). In the process, they also propose a theoretically-consistent empirical measure for comparative advantage which is able to fit the Ricardian ideas of comparative advantage in a proper way. The new theoretically-consistent measure of Ricardian RCA proposed by Costinot et al. (2012) is able to isolate the exporter-specific factors driving trade flows, and thus it fits better the original idea of Ricardian comparative advantage. A measure of revealed comparative advantage, in the spirit of the Ricardian model of trade, points to capture the innate productivity of a country in a given industry or product relatively to the other countries. The idea of Balassa index is to compare the performance of a country in one industry to the performance of a reference group of countries using export flows. In doing so, Balassa Index mixes up comparative advantage driven with other determinants of trade flows in approximating the RCA. Indeed, a proper export performance can be due to several factors that are not

directly linked to comparative advantage (formal or informal trade barriers, historical trade relationships, internal demand shock in a country, difference in preferences, etc.). According to the theoretical framework of (Costinot et al., 2012) we can control the factors causing trade disruption between two countries (such as trade barriers among countries, geographical distance, colonial ties and use of common language) as well as unilateral trade disruption factors (such as changes in political barriers, demand shocks and changes in consumers' tastes) employing a new index of comparative advantage based on an econometric model. In fact, this theoretical framework is Ricardian model with a production factor (labor) and k industries operating in perfect competitive condition. The main assumption is that the essential productivity of country i in an industry k is represented by $z_{ik.}$

The use of the criteria of essential productivity, zik, (the productivity of producing agricultural products which may be estimated by employing different indexes including TFP or producer price index) is a proper method and a path for estimating the comparative advantage of exporting country. Because this index can influence the process of trade and in fact indicates the substantive productivity level of country i (exporter) in the industry k. Also, in order to calculate zik, a new RCA index can be estimated. The new comparative advantage index is computed from the following relationship:

$$RCA_{ik} = \frac{z_{ik} z_{..}}{z_{i.} z_{.k}} \tag{3}$$

Where, z.. is the mean of zik for all industries and countries, z i. is the mean of zik for all of sectors and industries in country i. z. k is the mean of zik in industry (product) k for all of this product's exporters. Based on the relation (3) the country i has comparative advantage in the industry and sector k if RCAik is greater than unit. When the RCAik index is greater than 1 means that the average global productivity level z.. at the productivity level of country i in the industry k is greater than the expected value of zi. z. k. only two data types are required for this index: trade flows (export and import) and the productivity of the studied agricultural products. The productivity which is included into the NEW RCA index as the main variable is calculated through the inverse of producer price for agricultural products. The information related to the price of agricultural products in studied countries is collected from FAO. In the current research the newest data of FAO was applied. Statistical population under study is Asian countries (middle Asia, East Asia and West Asia, as well as neighboring countries) in which there is the possibility of creating mutual relationship.

3. Results and discussion

The share of top 11 exporting's countries of FOP sector from the rest of the world market in 2009-2015 is indicated in table 1. Table 1 illustrates that the highest ranking of FOPs export belongs to Netherlands, Colombia, Ecuador, and Kenya. According to data presented, in all periods Netherlands holds the main share (about 50%) of FOP sector.

Table 1- The share of each country's exports of FOPs world exports (by percentage)

Country	2009	2010	2011	2012	2013	2014	2015
Belgium	2/273	3.238	2.847	2.870	2.929	2.930	0.979
China	0.738	0.752	0.787	1.028	0.834	0.900	1.017
Colombia	14.325	16.359	13.781	14.505	13.950	14.097	15.119
Ecuador	7.464	8.015	7.488	8.809	8.752	9.419	9.570
Germany	0.643	0.547	0.865	0.947	0.968	0.956	0.971
Iran	n.a.	n.a.	0.133	0.003	0.008	0.003	0.002
Italy	1.122	1.170	0.981	0.968	0.977	0.890	0.982
Kenya	5.754	5.226	5.004	5.175	5.017	5.678	7.636
Malaysia	0.970	1.288	1.108	1.382	1.129	1.006	1.145
Netherlands	49.426	48.693	54.769	52.156	48.505	47.926	45.009
Thailand	1.039	1.078	0.894	0.868	0.775	0.710	0.784
U.S	1.096	1.065	0.746	0.405	0.344	0.306	0.331

n.a.: Data for Iran is just available from 2011
Source: Data from Un Comtrade Database. They are authors' estimates

In the present study, in order to determine the comparative advantage of FOPs exporting countries, two indicators of RCA and SRCA were employed in determining the comparative advantage of commercial and export dimensions in domestic and foreign studies. In order to prioritize the FOPs export markets and analyze its structure, data on the thousand dollar value of FOPs export in all exporting countries in the period of 2009–2015 is used, which is provided by Commodity Trade Statistics Database.

The evolution of RCA index of the various products included in the "cut flower and ornamental flowers" chapter was analyzed, The source of data was Trade MAP product classification which includes five sub-categories within chapter 6 "Living trees and flowers", The categories which will be analyzed in this section are class 0603 "Cut flowers and flower buds of a suitable kind for bouquets or for ornamental purposes, fresh, dried, dyed, bleached, impregnated or otherwise prepared".

The highest export volumes in the 0603 code are for Netherlands, Colombia and Ecuador, however, in calculating the RCA index, it is necessary to point out that the share of flower exports from total exports is for Colombia, Ecuador and Netherlands.
The 25 countries in Table 2 represent the major exporters of FOP from the total of 172 FOPs exporting countries. Of these 25 countries, five exhibit an RCA value equal to or greater than one in the export of FOP. Ecuador has a very high RCA in FOP, with values ranging from 57.8 in 2009 to 49.2 in 2011 and increased to 76.2 in 2015. This reflects the fact that FOP makes up a significant share in Ecuador's total exports and that the majority of Ecuador's FOP production is exported. Colombia, Netherlands and Kenya also have strong RCAs in FOP exports, with values in 2015 of 62, 14 and 2, respectively. The strength of the RCA in FOP has dropped for New Zealand since 2009

while, Netherlands and Kenya remained relatively constant prior to 2015. In the years 2009 to 2011, Egypt had no comparative advantage in FOPs exports. This means that the RCA index for the years was smaller than the unit and its RSCA index was negative, but in 2011, Egypt was able to relocate with a comparative advantage of 1.38% to the group of countries with a comparative advantage and increased level of 2.2 in 2014 and dropped by 1.45 in 2015.

Values for Malaysia and South Africa hover around unity, indicating no comparative advantage or disadvantage. Iran has a very low RCA. The export data of FOP are unavailable for 2009 and 2010. The RCA Index of Iran has decreased from 0.149 in 2011 to 0.009 in 2015; the relative decline in the index over the period under review, especially in recent years expresses the absence of a specific export strategy to improve the export performance.

The investigating contribution of each country to the FOPs global export indicates that the country's changes are proportional to the changes in production, export value, the share of RCA and the global export of FOP, so that each year the country's share of global exports of FOPs have been rising (declining), and the value of these indicators has also increased (decreased).

By increasing the FOPs export, these countries were able to gain a significant growth in export value. For example, the value of Egyptian FOPs exports has increased to ($35936 thousand) in 2014 from ($7098 thousand) in 2009. Therefore, these countries have declared themselves as rivals for other exporting countries of FOPs during these years. In other words, although revealed comparative advantage has not been observed in these countries, their growing trend suggests a comparative advantage in the near future. Therefore, the attribute comparative advantage is not a constant indicator and varies from one year to another.

Table 2- RCA index of exporting countries of FOPs for 2009-2015

Country	2009	2010	2011	2012	2013	2014	2015	Mean
Austria	0.096	0.098	0.063	0.083	0.077	0.057	0.044	0.074
Canada	0.105	0.154	0.151	0.163	0.164	0.162	0.206	0.158
Colombia	46.794	51.603	35.563	35.339	37.863	41.238	61.868	44.324
Denmark	0.058	0.078	0.035	0.041	0.024	0.034	0.075	0.049
Ecuador	57.781	57.560	49.257	54.233	55.986	58.692	76.247	58.537
Egypt	0.430	0.737	0.591	1.383	1.700	2.204	1.451	1.214
France	0.060	0.073	0.056	0.046	0.043	0.051	0.060	0.056
Germany	0.061	0.054	0.086	0.099	0.107	0.102	0.107	0.088
Hungary	0.063	0.107	0.100	0.084	0.070	0.075	0.079	0.083
Indonesia	0.054	0.055	0.076	0.140	0.075	0.090	0.206	0.099
Iran	n.a,	n.a,	0.149	0.004	0.018	0.008	0.009	0.038
Italy	0.296	0.329	0.275	0.283	0.301	0.269	0.313	0.295

Country	2009	2010	2011	2012	2013	2014	2015	Mean
Japan	0.003	0.003	0.002	0.003	0.004	0.008	0.012	0.005
Kenya	1.699	1.407	1.310	1.385	1.431	1.588	2.117	1.562
Malaysia	0.659	0.811	0.718	0.892	0.789	0.689	0.836	0.771
Netherlands	12.293	12.415	15.171	13.863	13.556	13.445	13.873	13.517
New Zealand	1.327	1.392	1.059	1.134	1.012	0.752	0.964	1.091
Peru	0.352	0.339	0.326	0.343	0.385	0.381	0.467	0.370
South Africa	0.720	0.637	0.484	0.742	0.587	0.601	0.738	0.644
Spain	0.253	0.225	0.210	0.171	0.210	0.218	0.234	0.217
Taipei, Chinese	0.115	0.177	0.181	0.226	0.174	0.162	0.172	0.173
Thailand	0.731	0.693	0.574	0.555	0.541	0.500	0.543	0.591
Turkey	0.346	0.382	0.326	0.332	0.310	0.334	0.335	0.338
United States	0.111	0.105	0.074	0.039	0.035	0.030	0.032	0.061

n.a: Data for Iran is just available from 2011
Source: Data from UN Comtrade Database

Mentioning that the RCA is between zero and infinite, it is observed that the range of the modified and superficial index is between -1 and +1, so that the SRCA is closer to number 1, the comparative advantage is greater, and instead of each whether from zero to number -1, the lack of comparative advantage is exacerbated. The incremental trend of this index over a period of time indicates an improvement in the competitive position of a commodity globally or in a particular region in the context of appropriate opportunities or the use of opportunities provided. Among the investigated countries, Ecuador Colombia, Netherlands and Kenya demonstrate a positive value in all periods; Egypt could change its initial comparative disadvantage to a comparative advantage from 2011 to 2012-2015, while New Zealand lost its initial comparative advantage in 2014 year.

Table 3 - Symmetric Relative comparative advantage Index (SRCA)

Country	2009	2010	2011	2012	2013	2014	2015
Austria	-0.824	-0.821	-0.881	-0.846	-0.856	-0.892	-0.916
Canada	-0.810	-0.733	-0.737	-0.720	-0.719	-0.721	-0.659
Colombia	0.958	0.962	0.945	0.945	0.949	0.953	0.968
Denmark	-0.890	-0.855	-0.933	-0.921	-0.953	-0.934	-0.860
Ecuador	0.966	0.966	0.960	0.964	0.965	0.966	0.974
Egypt	-0.399	-0.151	-0.257	0.161	0.259	0.376	0.184
France	-0.887	-0.865	-0.894	-0.913	-0.917	-0.903	-0.887
Germany	-0.885	-0.897	-0.842	-0.821	-0.807	-0.814	-0.807

Country	2009	2010	2011	2012	2013	2014	2015
Hungary	-0.881	-0.807	-0.819	-0.846	-0.869	-0.861	-0.853
Indonesia	-0.897	-0.896	-0.859	-0.754	-0.861	-0.835	-0.658
Iran	n.a.	n.a.[1]	-0.740	-0.991	-0.964	-0.985	-0.983
Italy	-0.543	-0.505	-0.568	-0.558	-0.537	-0.576	-0.524
Japan	-0.994	-0.993	-0.995	-0.994	-0.992	-0.985	-0.977
Kenya	0.259	0.169	0.134	0.161	0.177	0.227	0.358
Malaysia	-0.205	-0.104	-0.164	-0.057	-0.118	-0.184	-0.090
Netherlands	0.850	0.851	0.876	0.865	0.863	0.862	0.866
New Zealand	0.140	0.164	0.029	0.063	0.006	-0.141	-0.018
Peru	-0.479	-0.494	-0.508	-0.489	-0.444	-0.449	-0.363
South Africa	-0.163	-0.222	-0.348	-0.148	-0.260	-0.249	-0.151
Spain	-0.596	-0.632	-0.653	-0.708	-0.653	-0.642	-0.620
Taipei,Chinese	-0.794	-0.699	-0.693	-0.631	-0.704	-0.722	-0.706
Thailand	-0.155	-0.181	-0.270	-0.286	-0.298	-0.333	-0.296
Turkey	-0.486	-0.447	-0.508	-0.502	-0.527	-0.499	-0.498
United States	-0.800	-0.811	-0.862	-0.926	-0.933	-0.941	-0.938

Source: SRCA values are authors' estimates

Table 4 reports the results of the Galtonian regression analysis of technological specialization for the all countries and the selected countries by applying equation (3). When $0 < \beta < 1$ is the case, the existing pattern of specialization is unchanged, but the gap between competitive and less competitive industries narrows. The variance of the SRCA index measures the degree of specialization, which can also be measured as β / ρ. If $\beta > \rho$, the degree of specialization increases. If $\beta < \rho$, then it decreases. When $\beta = \rho$, the dispersion of the distribution is unchanged. In the perspective term (2009-2015) the results indicate a general decrease in the dispersion of export specialization, implying a trend towards a decrease in specialization. Therefore, all countries of FOP export won't become more specialized. However, the decrease in dispersion is rather weak. On average there is no strong β/R tendency towards de-specialization (decline in β/R).

Table 4: The result of the examination of the specialization of the world exporters of FOP (OLS Galtonian regression)

	2009-2012			2012-2015			2009-2015		
	β	R	β/R	β	R	β/R	β	R	β/R
All world	0.959	0.974	0.98	0.978	0.982	0.996	0.942	0.962	0.979
7 country	0/71	0.88	0.81	0.985	0.976	1.01	0.698	0.86	0.81

Note: 7 countries as follows Colombia, Ecuador, Egypt, Kenya, Netherlands, New Zealand

In this section new RCA for some exporter in FOPs sector the number 38 of trade partners and years is investigated. Given the data limitation in regions under study, only those countries in which the information was existed in FAO website data in the period of 2007–2014 were selected. As Table 5 illustrates the New RCA index in Iran had comparative advantage in 2007-2010 but it didn't have comparative advantage in 2010 up to 2014. It was revealed that in 2007, Cambodia, Canada, Chile, Hong Kong, Colombia, Cuba, Ecuador, Egypt, India, Indonesia, Iran, Kenya, Malaysia, Mexico, New Zealand, Peru, South Africa, Turkey, England, Vietnam had comparative advantage. In 2008, Chile, Hong Kong, Ecuador, Egypt, France, Hungary, India, Indonesia, Iran, japan, Kenya, Malaysia, Mexico, Peru, Poland, South Africa, Thailand, Turkey, England, had comparative advantage.

This is only an example of potential applications for this dataset. The changes that may occur over time in comparative advantage might be analyzed as well and other econometric applications are possible. In these cases the user requires to be informed about the empirical distribution characteristics of the new RCA index.

Table 5: Results for the estimation of NEW RCA index

Country	2007	2008	2009	2010	2011	2012	2013	2014
Australia	0.930	0.900	0.920	1.051	1.043	1.095	1.116	1.128
Austria	0.902	0.987	1.087	1.010	1.053	0.992	1.029	1.092
Belgium	0.863	0.976	1.022	1.061	1.113	1.076	1.055	1.208
Cambodia	1.088	0.953	0.974	0.950	0.965	0.961	0.970	0.976
Canada	1.003	0.932	0.971	1.085	1.009	0.996	0.992	0.983
Chile	1.060	1.066	0.937	1.010	1.016	0.970	0.858	0.886
Hong Kong	1.189	1.015	0.953	0.960	0.929	0.919	0.895	0.875
Colombia	1.017	0.998	0.893	0.953	0.971	1.041	1.145	1.051
Cuba	1.110	0.933	0.926	0.922	0.899	0.929	0.930	0.925
Denmark	0.928	0.946	1.104	1.103	1.047	0.999	0.989	1.032
Ecuador	1.076	1.035	0.887	0.921	1.003	1.010	0.994	0.930
Egypt	1.109	1.075	1.031	0.963	0.933	0.931	0.894	0.836
France	0.894	1.005	1.077	1.009	1.062	1.003	1.028	1.104
Germany	0.880	0.939	1.141	1.064	0.999	1.011	1.023	1.112
Hungary	0.890	1.059	1.128	1.033	0.960	0.863	0.958	1.027
India	1.061	1.117	0.964	0.897	0.956	1.026	0.918	0.858
Indonesia	1.273	1.124	1.054	0.996	0.765	0.764	0.761	0.705
Iran	1.443	1.200	1.029	1.008	0.954	0.679	0.444	0.386
Italy	0.912	0.991	1.028	1.068	1.110	1.068	1.042	1.025
Japan	0.902	1.002	0.974	0.993	1.124	1.127	1.125	1.116

Country	2007	2008	2009	2010	2011	2012	2013	2014
Kenya	1.126	1.039	0.919	1.059	0.953	0.924	0.983	0.853
Lithuania	0.851	0.917	1.163	1.026	0.953	1.017	1.013	1.134
Malaysia	1.080	1.082	0.971	0.847	0.792	0.971	1.102	1.081
Mexico	1.051	1.062	0.962	0.989	0.978	0.984	0.988	0.951
Netherlands	0.862	0.973	1.053	1.024	1.144	1.107	1.040	1.117
NewZealand	1.112	0.907	0.995	1.003	0.902	1.022	1.091	0.908
Peru	1.058	1.016	0.947	0.992	0.957	1.014	1.031	0.950
Poland	0.927	1.055	1.073	1.051	0.964	0.938	0.954	1.040
Portugal	0.925	0.948	0.981	1.010	1.128	1.061	1.050	1.094
Singapore	0.942	0.940	0.886	1.036	1.114	1.142	1.097	1.041
South Africa	1.056	1.029	0.952	1.027	0.997	0.935	0.889	0.868
Spain	0.862	0.950	1.004	0.997	1.143	1.102	1.102	1.127
Thailand	0.948	1.015	1.025	0.922	0.875	1.023	1.105	1.127
Turkey	1.061	1.051	0.985	0.930	0.980	1.006	1.026	0.881
England	1.052	0.975	0.986	1.007	0.975	0.954	0.913	1.006
U.S	0.937	1.024	1.093	0.991	0.956	0.942	1.007	0.997
Vietnam	1.036	0.942	0.920	0.763	0.806	0.810	0.772	1.271

Source: Research finding

Most of the studies on commercial and industrial policy relied extensively on the concept of revealed comparative advantage, often measured by Balassa Index and employed by cross-country and cross-industry comparison. However the statistical properties of Balassa Index distribution were criticized (Hinloopen and Van Marrewijk 2001) and its power in cross country (industry) comparison was questioned. Hence, the present section describes the statistical distribution properties of the RCA index compared with the traditional Balassa index of revealed comparative advantage. One of the main problems in application of traditional Balassa index for economic analysis is its poor ordinal ranking property (Yeats 1985). Indeed it may be the case that for a given sector, the majority of specific country indexes of comparative advantage (namely Balassa index) are concentrated slightly above (or below) one; in this situation the top-rank country in the sector may have a relatively low comparative advantage index with respect to its own specialization in other sectors. On the other hand, it may also be the case that, in another export sector flows are highly concentrated in few countries; in this case the country with the lowest comparative advantage index may still have a very high Balassa index. As a consequence, the numeric values of Balassa index won't necessarily provide the right ordinal ranking of a country's comparative advantage when the underlying distribution of index values are different across industries (see UNIDO 1982).

Table 6 indicates, by country, mean values of new RCA and RCA indexes. In both

cases, the mean new RCA index is more asymmetric than RCA mean. This may represent a problem in applying RCA Index as explanatory variable in econometric based analysis. The countries with a benchmark RCA>1 are Colombia, Ecuador, Netherlands, Kenya and New Zealand. The relatively high value of exports to Colombia and Ecuador are remarkable. This highlights the importance of flower export share in all export. While New RCA index indicates that countries of Austria, Canada, Cambodia, Denmark, Ecuador, France, Germany, Italy, japan, Netherland, Spain, Thailand have comparative advantage.

Table 6– Average of new RCA and RCA index based on yearly export flows

Country	Mean new RCA	Mean RCA
Austria	1.044	0.084
Canada	1.006	0.147
Colombia	1.009	41.432
Denmark	1.045	0.047
Ecuador	1.007	54.963
Egypt	0.931	0.968
France	1.047	0.055
Germany	1.059	0.081
Hungary	0.995	0.085
Indonesia	0.841	0.080
Iran	0.75	0.057
Italy	1.057	0.297
Japan	1.076	0.003
Kenya	0.947	1.446
Malaysia	0.961	0.774
Netherlands	1.081	13.459
New Zealand	0.987	1.185
Peru	0.982	0.349
South Africa	0.945	0.634
Spain	1.079	0.213
Thailand	1.013	0.619
Turkey	0.968	0.339
U.S	0.998	0.073

4. Conclusion

The present study aimed at identification of the world export markets of FOPs by analyzing the comparative advantage of exporting countries. Based on UN Comtrade database, some countries were selected as major FOPs exporters in the study period. Main findings

revealed the comparative advantage of countries according to 3 indices (RCA, SRCA, New RCA). But the RCA index, namely; recommends Ecuador, Colombia, Netherlands and Kenya as markets with the highest exporting comparative advantage. In other words, the market mostly followed the competitive structure. Among 28 importing countries, Netherlands, Colombia, and Kenya have the largest export share and high potential in leading FOPs world export market. As the Galtonian regression for a set of FOP exporting countries indicates that specialization in export is diverted.

The current paper intended to present a new database on new Ricardian comparative advantage measure proposed by Costinot et al. (2012). In this regard, some FOPs exporters of the new index are presented as comparison with the traditional Balassa Index. The new measure proposed by Costinot et al. (2012), conceptually fits 8 country sector of Ricardian comparative advantage better than Balassa Index. In fact, based on the export flows computation, Balassa Index mixes up exporter with importers and sector specific factors driving export flows. The results of new RCA for 38 countries indicate that compared to other countries, Cambodia, Canada, Chile, Hong Kong, Colombia, Cuba, Ecuador, Egypt, India, Indonesia, Iran, Kenya, Malaysia, Mexico, New Zealand, Peru, South Africa, Turkey, England and Viet Nam have the highest value of index. Netherlands was found to have the comparative advantage in the FOP sector.

The Calculations of the RCA index indicate that Iran has no comparative advantage and the volatility is observed over the period of the study. But in the New RCA index, it has a comparative advantage in 2007-2010 periods. Iran could have a high potential for export of FOPs, but the realization of this case depends on greater technical knowledge, proper management and the optimal use of existing capacities.

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