Competitiveness in international orange trade

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Abstract

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This paper examines the competitiveness of international orange trade over the period 1993-2018 based on global data. The paper uses the methodology of comparative advantages to analyse fresh orange and orange juice data. Results suggest that most competitive countries are focusing on processed orange trade. Although Brazil is the world's largest orange-producing country, it is not among the top 10 countries in the global orange fruit market, representing that it mainly focuses on processing. Results also suggest that there is no high concentration in the export market for fresh oranges, however, Spain's share is growing steadily, as well as South Africa and Egypt can be mentioned as emerging nations. With further analysis of the international orange trade, Egypt's comparative advantage over fresh oranges increased the most and had the highest results in recent periods followed by South Africa, Greece and Spain. By examining global orange juice trade, it is not surprising that Brazil had the largest comparative advantage, although its value is constantly declining. With a dynamic analysis of comparative advantages, a large decrease can be observed in the chance of survival of the advantages.

Keywords: comparative advantage; orange; Balassa; survival

Introduction

Orange, requiring a subtropical climate, has become one of the most basic fruits of our diet, both fresh and in the form of processed orange juice. Oranges or orange juice can be bought in almost every grocery store, due to international agricultural trade. This paper deals with the analysis of the competitiveness of global orange trade. By exploring up-to-date data, the analysis provides an insight of the positions of the largest participants in the international orange trade in the period 1993-2018. It also shows which part of the sector each producer country specializes in and in addition, the paper attempts to explore the underlying causes of competitiveness.

The paper first presents the empirical background of the topic, followed by a description of the data used and then the methodology used. The fourth section deals with the competitiveness of the international orange trade, in which it first describes the short history of the fruit and the cultivation indicators. The paper then presents the largest competitors in global orange trade (both in terms of oranges and orange juice) and analyses the comparative advantages of the most influential countries using Balassa indices and survival rates. The last section summarises the results and draws conclusions.

Literature review

Research examining competitiveness through trade is a limited but growing part of the scientific literature. This review, starting with a geographical basis, provides an insight into published studies without claiming of being exhaustive.

In Europe, Bojnec & Fertő (2008) examined the competitiveness of agricultural products in eight Central and Eastern European countries, including Hungary. As the processing industries of these countries are less developed compared to the western regions, indicators of agricultural raw materials had much higher values than the higher manufactured goods. In addition, according to the paper, EU accession had a major impact on the comparative advantages of food products in the region, although the level of agricultural trade has shown an increasing trend in the respective states. This is also confirmed in a later study by Bojnec & Fertő (2014), in which the comparative advantages of agricultural and food exports in the countries of the European Union were analysed between 2000 and 2011, including the 2004 and 2007 enlargements. The paper concluded that most agricultural export products in the EU-27 are relatively disadvantaged in global markets, however, the enlargement of the European Union, albeit slightly, has had a positive effect on the countries' comparative advantages.

Balogh & Jámbor (2017) also examined agri-food trade of the countries of the European Union; however, they focused on wine-producing regions between 2000 and 2013. Their study found that of the 16 wine-producing countries, Bulgaria, France, Cyprus, Greece, Italy, Portugal and Spain had comparative advantages, but only Spain, Italy and France had a stable market share. In addition, Hungary is among the nine countries with a comparative disadvantage. Lingard (2003) analysed the competitiveness of Kosovo's agricultural products, which pointed to the comparative advantage of cereals, although there is a disadvantage in the milk and potato market. Based on these, he concluded that it is not worthwhile for the country to export milk and potatoes to international markets.

Maslova et al. (2019) examined the agri-food trade performance of the Eurasian Economic Union (EAEU) (Russia, Kazakhstan, Belarus, Armenia, Kyrgyzstan), and found that grain production in Russia and Kazakhstan was competitive both in the EAEU internal market and in the global market. In the period 2014-2016, the main factors increasing competitiveness were the decrease in domestic production prices and the increase in production volume. These aspects will allow the EAEU countries to gain a larger share of the international market for cereals and processed products in the future.

In Africa, Chingarande et al. (2013) examined the competitiveness of East African Community (EAC) member states, which showed a comparative advantage in trade in more than 400 products in Kenya, Tanzania, and Uganda, as well as significant results in Rwanda and Burundi. However, Member States need higher GDP growth that exceeds population growth to ensure sustainable economic development. In the same region, Ndayitwayeko et al. (2014) also support the results of this research, so the province, led by Uganda and Kenya, was competitive in terms of global coffee exports between 2000 and 2012. Beyene's (2014) study analysed the competitiveness of North Africa, Sub-Saharan Africa, and Middle East Africa in the period 1995–2012, according to which the sub-Saharan region of Africa had comparative advantages.

Korinek & Melatos (2009) studied the countries of the South American Common Market (Mercosur), and the results for coffee, margarine, and vegetable oils showed comparative advantages between 1998 and 2004. Beyene's (2014) study supports the conclusions of the previous analysis that the manifest comparative advantage was seen in several countries for Latin America and the Caribbean.

Based on the regions of Central America, Málaga and Williams (2006) concluded from Mexico's competitiveness indicators that agricultural and food exports have a predominantly comparative disadvantage between different products, except for fruit and vegetable exports, where it is clear the comparative advantage. Regarding North America, Canada is an export-oriented country in the agricultural sector as well as in processed foods, but there is a declining trend in these sectors (Sparling & Thompson, 2011). The challenge for the sector is to increase higher added value for primary products that enter the export market. The study of Sarker & Ratnasena (2014) also supports the relative disadvantage of Canadian agricultural export products, and the analysis showed a comparative advantage only in the case of wheat.

In the case of Australia, Linehan et al. (2012) expect the largest growth in the competitiveness of the country's agricultural products in the beef, grain, dairy and lamb export markets in the future, with China's buyer share outstanding. Disdier et al. (2015) realized the greatest competitiveness in the markets of beverages, fruit and vegetables, and dairy products in Australia and New Zealand, due to the availability of important markets after the liberalization of agricultural trade.

On a product basis, Akmal et al. (2014) concluded a weakening of competitiveness in Pakistan's Basmati rice exports, which implies the need for change. According to a study by Astaneh et al. (2014), Iranian stone fruits are gaining an increasing advantage according to their comparative advantages in the global market. Moreover, according to a study by Kuldilok et al. (2013), the decline in the competitiveness of Thai tuna exports, which have the largest market, has stopped.

Naseer et al. (2018) examined the competitiveness of the world's 15 largest mandarin-exporting countries over the period 2007–2016, paying particular attention to the situation in Pakistan. Their research was conducted using revealed symmetric comparative advantages (RSCA) and an

attempt was made to study the effect of productivity growth and the real effective exchange rate on mandarin production using panel regression analysis. The results showed different RSCA patterns among the selected countries, and only five nations (Morocco, Spain, Pakistan, Turkey and Peru) had a comparative advantage in mandarin exports, while the other states were at a relative disadvantage. Nevertheless, Pakistan's results illustrated the biggest change in RSCA, pointing to the development of the mandarin industry.

Turkey is one of the countries that occupy an important place in the export of olive oil and table olives, and the same products also play a significant role for the state in organic production (Kilic & Turhan, 2020). In the case of table olives, out of the 8 leading exporting nations examined, Turkey had strong export performance compared to Egypt and Argentina, but did not show the same advantage over Spain, Greece and Morocco.

Materials and Methods

Using the Revealed Comparative Advantage (RCA) methodology, the competitiveness of trade between different products and between countries can be measured, the formula of which was based on the idea of Balassa (1965):

$$RCA_{ij} = \left(\frac{x_{ij}}{x_{it}} \middle/ \frac{x_{nj}}{x_{nt}} \right),$$

where x is the value of the export, i is the specified country, j is the product, t is the product group, and n is the product group. Based on the formula, the methodology of comparative advantages can be interpreted as dividing the product and product group of a given country by the ratio of the product and product category of a given group of states to obtain the value of manifest comparative advantages (RCA), i.e. the Balassa index. If the value of the RCA index is higher than one, comparative advantage applies.

In this paper, the trade indicators in the HS6 level breakdown of the World Bank (WITS) database serve as the basis for the calculation. Data for the HS1988/92 system are available for the period 1993-2018. With the necessary information, the group of countries concerned covers the world and, in the case of the product, trade in oranges (080510), orange juice frozen (200911) and orange juice without the freezing process (200919).

After calculating the Balassa indices, it may be worthwhile to examine the persistence of the manifest comparative advantages (or disadvantages), which is examined by the most common non-parametric method, estimating the Kaplan-Meier S (t) survival function. Based on Bojnec & Fertő (2008), we assume that the sample contains n indepen-

dent observations, where i = 1, 2,…, n, ti is the survival time and ci is a censoring indicator variable with a value of 1 if the error occurs in the event of no exports, otherwise zero for observation. Furthermore, it is probable that m <n for the observed error. Ranked survival times are denoted as follows: $t_1 < t_2 < … < tm$. The risk of error at time tj denotes the number of observed errors by dj. In this case (with t <t1 convention) the Kaplan-Meier function can be written as follows:

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

Global Trends in International Orange Production and Trade

As shown on Figure 1, 75 percent of the world's orange production is concentrated in the following 10 countries: Brazil, China, India, the United States, Mexico, Spain, Egypt, Indonesia, Turkey, and Iran. The reason behind that is growing oranges, like other citrus fruits, requires constant sunshine and rainfall. This requires a subtropical climate, which is in the northern and southern hemispheres of the Earth between 23.5 and 40 degrees, where the average annual temperature is 10–20°C (Morton, 1987). Thus, despite that the fruit originally came from East Asia, several African, European, and American countries are now proving to be internationally significant producers (FAO, 2019).

Of the countries listed above, Brazil, as well as the United States, use most of the products for processing, making various juices, orange juices, and concentrates. Figure 1 shows that the majority of countries producing oranges are developing countries. However, the economies and trade of
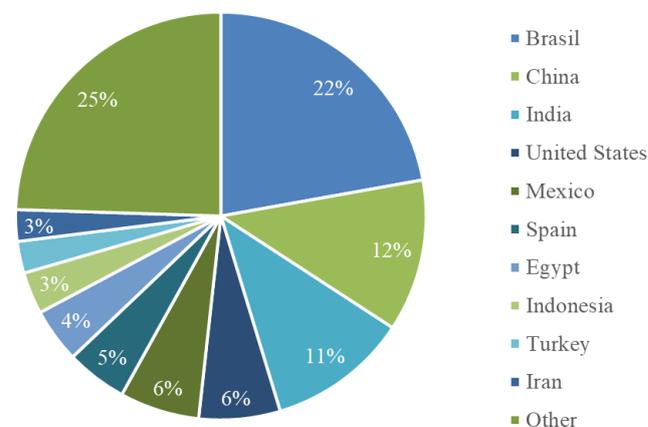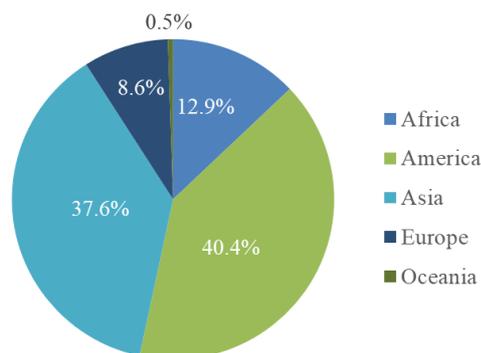

Fig. 1. Distribution of orange production in the world in 2018 by country
Source: Own composition based on FAO (2019) data

these countries are not concentrated only on the cultivation of oranges so they are not exposed to sectoral risks.

Figure 2 shows that orange-growing regions have now been extended globally. The share of producers in areas of origin of citrus fruits was surpassed by America (with the U.S. and Brazil being the most significant), accounting for 40.4 percent of world orange production, followed by Asia with 37.6 percent. Thus, in addition to Asia, 62.4 percent of the fruit is grown on the other 4 continents.

Fig. 2. Distribution of orange production in 2018 by continent
Source: Own composition based on FAO (2019) data

However, world orange trade has shown an increasing trend over the last 25 years, albeit at a slower pace (Figure 3). By 2018, exports nearly quadrupled from 1993 levels (from $1.4 billion to $5.2 billion). This increase can be observed in almost all sectors because of technological development, population growth and the consequences of globalization. Thus, the value of international agricultural exports increased approximately sixfold (from $245 billion to $1.4 trillion) and total world trade increased nearly sevenfold during this period (from $2.6 trillion to $18 trillion).
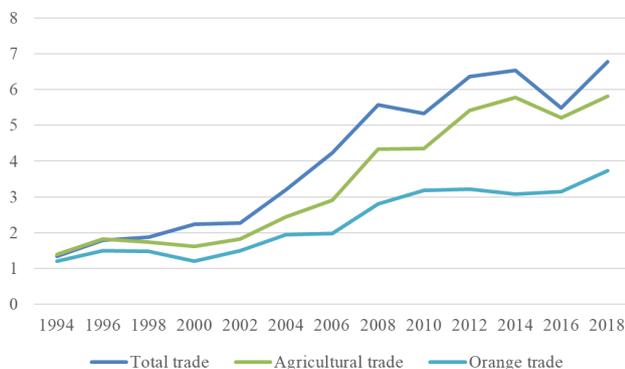
Fig. 3. Development of orange-, agricultural-, and total trade in the world, 1994-2018 (1993 = 1)
Source: Own composition based on World Bank (2019) data

In terms of global orange trade, it is also worth examining the share of the largest exporting countries. From Table 1, it is clear that a significant part of the largest production areas are also among the TOP10 exporting countries, such as Spain, which ranks first in each period, as well as in the share of exports (about 2-3% in each period), showing an increasing trend. In addition, the United States also has a larger share during the periods, although South Africa took its place in the last period.

The distribution of world orange exports is not concentrated as over the periods, countries gave 9-36 percent of the world's orange supply. However, the share of the 10 largest exporting nations has steadily been increasing. Note that Brazil, producing the largest amount of oranges, was not among the TOP10 countries in any of the periods analysed, suggesting that it focuses mainly on fruit processing.

However, in addition to fresh sales, the consumption of orange juice, and thus their sale and trade, is also significant worldwide. In 2018, the total value of orange juice exports exceeded $5.4 billion. In contrast to orange exports, there is a strong concentration in the sale of orange juice made from citrus fruits (Annexes 1 and 2).

As already mentioned, Brazil focuses on processing rather than selling fresh fruit. So that the orange juice and concentrates produced are sold in much larger quantities and value on the international market. Brazil had a steady 50-60 percent share of the world's orange juice trade until 2018, although there is a declining trend over the periods (Annex 1). In addition to Brazil, several countries have high export rates that are unlikely to have an environment conducive to orange growing, such as Germany, Belgium, and France. Their significant share is presumably because unprocessed fruit, orange juice or concentrate imported from the largest orange-growing and exporting countries is destined for further processing by local companies and sold under different brands. For example, the German-based Valensina or the Hohes C (AIJN, 2018) can be found in many European food stores.

In terms of import, more patterns become observable (Table 2). Although there is an increasing trend in concentration in terms of imports, it was also very low for the last period. Thus it seems evident that the 10 largest orange importers in the world occupy a stable position in trade, as almost the same states line up in each period, such as Germany, France and the United Kingdom.

By comparing Table 1 and Table 2, the Netherlands appears both as a significant exporter and a significant importer at the same time, suggesting intra-industry trade patterns. This may raise questions from the exports point of view as the country does not have the appropriate facilities for or-

Table 1. The world's largest orange exporters as a percentage of total orange exports (1993-2018)

1993-1996		1997-2003		2004-2010		2011-2018	
Spain	4.10%	Spain	7.11%	Spain	9.10%	Spain	11.52%
United States	1.72%	United States	2.89%	United States	3.14%	South Africa	5.73%
South Africa	0.76%	South Africa	1.47%	South Africa	3.05%	United States	5.56%
Morocco	0.68%	Morocco	1.06%	Egypt	1.89%	Egypt	4.60%
Greece	0.59%	Greece	1.02%	Netherlands	1.45%	Netherlands	2.06%
Netherlands	0.50%	Netherlands	0.78%	Greece	1.11%	Turkey	1.71%
Australia	0.37%	Australia	0.75%	Morocco	0.99%	Greece	1.48%
Italy	0.31%	Italy	0.53%	Turkey	0.84%	Australia	1.40%
Israel	0.25%	Turkey	0.41%	Australia	0.81%	Italy	1.02%
Turkey	0.17%	Israel	0.36%	Italy	0.70%	China	0.87%
TOP10	9.4%		16.4%		23.1%		35.9%

Source: Own composition based on World Bank (2019) data

ange production based on its geographical location. The fact that one of the Benelux countries ranks among the 10 largest exporters of oranges in the world is presumably due to Europe's largest port in Rotterdam. Shipments from overseas can go to Europe here and are likely to be transported from there to different Member States.

Although there is a low concentration in fresh orange imports, the share of countries in orange juice imports is strong (Annexes 3 and 4). The concentration of orange juice trade, however, shows a declining trend in both exports and imports. Trade and production were concentrated 10 years ago in Brazil and the United States (Florida). During this period, these countries were able to produce a total of 640 million boxes of oranges (one box contains 40.8 kg of oranges). In the last few years, however, average production has been enough for approximately 244 million cans in Brazil and 70 million in Florida, which is about half of the production of 10 years ago. This is partly due to a sharp increase in production costs and lower yields due to various illnesses. Furthermore, with rising costs, much more oranges are need-

ed today to produce a ton of orange juice than was needed 10 years ago. In Brazil, currently 290 cans of oranges are needed to produce 1 ton of orange juice, up from 250 cans a few years ago. This problem represents a cost increase of 40 cans per tonne in the production of orange juice (Neves et al., 2019). In addition, consumer habits for fruit juices have changed (more health-conscious shopping, sugar control), a phenomenon that may play a role on the demand side in the orange juice market. According to a 2018 report by the European Fruit Juice Association, global juice consumption has fallen by more than 1 percent compared to previous years, for which a further decline is expected (AIJN, 2018).

Competitiveness of Global Orange Trade

Examining the results of the Balassa index, it is clear that Morocco had exceptionally high values in the first and second periods, but these results are steadily declining. Furthermore, the results of 8 of the 10 largest orange exporters show a comparative advantage. During the period analysed, Egypt's comparative advantage increased the most, presum-

Table 2. The world's largest orange importers as a percentage of total orange imports (1993-2018

1993-1996		1997-2003		2004-2010		2011-2018	
Germany	1.1%	Germany	1.8%	Germany	2.6%	France	3.1%
France	0.8%	France	1.6%	France	2.5%	Germany	3.0%
Netherlands	0.7%	Netherlands	1.1%	Netherlands	2.2%	Netherlands	2.8%
Japan	0.6%	United Kingdom	1.1%	Russia	2.0%	Russia	2.8%
United Kingdom	0.6%	Hong Kong	1.0%	United Kingdom	1.5%	Hong Kong	1.9%
Hong Kong	0.6%	Japan	0.7%	Saudi Arabia	1.0%	United Kingdom	1.7%
Canada	0.4%	Canada	0.7%	Canada	1.0%	China	1.6%
Saudi Arabia	0.3%	Russia	0.6%	Belgium	0.9%	South Korea	1.5%
Switzerland	0.2%	Belgium	0.5%	Hong Kong	0.9%	Canada	1.4%
Sweden	0.2%	Saudi Arabia	0.5%	South Korea	0.8%	Saudi Arabia	1.3%
TOP10	5.5%		9.7%		15.4%		21.1%

Source: Own composition based on World Bank (2019) data.

ably due to closer diplomatic relations between Egypt and Russia, which led to an increase in the countries bilateral agricultural trade (Hatab, 2016) (Table 3).

In the trade in frozen orange juice, it is not surprising that Brazil has outstanding values in all periods, although there has been a steady decline in the results (Table 4). Apart from Brazil, Mexico has a stable comparative advantage,

which shows a steady upward trend based on the results, and then the next seven countries show a continuous change over time, while Germany's situation does not show a comparative advantage at all.

In the case of orange juice exported without a freezing process, Brazil did not initially have a comparative advantage, but its values show a large-scale increase, surpassing

Table 3. Comparative advantages in the global orange trade, based on the highest Balassa indices (1993-2018)

Country	1993-1996	1997-2003	2004-2010	2011-2018
Egypt	8.13	25.87	40.10	70.16
South Africa	10.97	18.36	23.72	26.21
Greece	20.93	27.82	22.32	18.58
Spain	18.38	18.12	18.65	15.90
Morocco	55.36	45.75	32.82	12.75
Turkey	3.21	4.01	3.98	4.81
Unitred States	1.23	1.36	1.54	1.75
Netherlands	1.15	1.17	1.56	1.63
Italy	0.70	0.66	0.74	0.87
China	0.07	0.02	0.13	0.16

Source: Own composition based on World Bank (2019) data

Table 4. Comparative advantages in the global trade of frozen orange juice, based on the highest Balassa indices (1993-2018)

Country	1993-1996	1997-2003	2004-2010	2011-2018
Brazil	53.80	60.28	53.41	40.57
Mexico	1.52	1.10	3.68	7.46
Netherlands	4.35	2.99	0.88	1.50
Spain	0.15	0.36	1.27	1.45
Italy	0.25	0.49	1.34	1.43
United States	0.70	0.70	1.03	1.04
South Africa	0.26	1.16	0.90	0.96
Belgium	n.a.	3.45	0.47	0.36
Morocco	5.40	2.33	0.18	0.30
Germany	0.03	0.04	0.07	0.04

Source: Own composition based on World Bank (2019) data

Table 5. Comparative advantages in the global orange juice trade (non-frozen), based on the highest Balassa indices (1993-2018)

Country	1993-1996	1997-2003	2004-2010	2011-2018
Brazil	0.16	4.68	16.38	23.43
Costa Rica	27.76	30.35	24.43	18.37
Belgium	n.a.	6.07	9.43	9.08
Netherlands	1.16	1.40	3.65	4.99
Spain	4.06	4.14	2.81	2.48
Germany	2.46	2.34	1.05	0.86
United States	1.32	1.22	0.94	0.81
Ireland	1.95	3.34	0.90	0.74
France	0.38	1.13	0.49	0.39
Switzerland	0.35	1.27	1.55	0.09

Source: Own composition based on World Bank (2019) data

Table 6. Kaplan-Meier survival rates for Balassa indices by country (1993-2018)

Year	Brazil	United States	Spain	Italy	Egypt	Greece	South Africa	Nether-lands	Germany	Turkey
1993	0.9744	0.9872	0.9872	-	-	0.9872	0.9744	0.9872	0.9744	0.9744
1994	0.9614	0.9740	0.9740	0.9600	0.9701	0.9740	0.9484	0.9872	0.9484	0.9484
1995	0.9480	0.9605	0.9605	0.9200	0.9398	0.9605	0.9220	0.9735	0.9220	0.9220
1996	0.9205	0.9466	0.9466	0.8800	0.9398	0.9466	0.8953	0.9735	0.8953	0.8953
1997	0.9066	0.9322	0.9322	0.8400	0.9398	0.9322	0.8682	0.9587	0.8682	0.8682
1998	0.8778	0.9174	0.9174	0.8000	0.9398	0.9322	0.8406	0.9435	0.8406	0.8406
1999	0.8632	0.8868	0.9021	0.7600	0.9227	0.9167	0.8126	0.9278	0.8126	0.8126
2000	0.8632	0.8713	0.8863	0.7200	0.9050	0.9006	0.7841	0.9115	0.7841	0.7841
2001	0.8632	0.8552	0.8699	0.6800	0.9050	0.8839	0.7696	0.8946	0.7550	0.7550
2002	0.8463	0.8384	0.8528	0.6400	0.8673	0.8666	0.7545	0.8946	0.7254	0.7254
2003	0.8286	0.8035	0.8351	0.6133	0.8673	0.8305	0.7388	0.8760	0.6952	0.6952
2004	0.8102	0.7856	0.8351	0.5861	0.8471	0.8120	0.7059	0.8760	0.6643	0.6643
2005	0.7909	0.7669	0.8152	0.5582	0.8259	0.7927	0.6723	0.8760	0.6327	0.6327
2006	0.7706	0.7276	0.8152	0.5295	0.8036	0.7927	0.6551	0.8535	0.6002	0.6002
2007	0.7492	0.6871	0.7925	0.4854	0.7807	0.7927	0.6187	0.8298	0.5502	0.5669
2008	0.7265	0.6455	0.7925	0.4560	0.7807	0.7447	0.5812	0.8047	0.5169	0.5325
2009	0.7023	0.6240	0.7925	0.4256	0.7546	0.7198	0.5618	0.8047	0.4652	0.4970
2010	0.6763	0.6009	0.7925	0.3941	0.7267	0.6932	0.5618	0.7749	0.4135	0.4602
2011	0.6481	0.5758	0.7925	0.3612	0.6964	0.6643	0.5384	0.7749	0.3618	0.4219
2012	0.6173	0.5484	0.7925	0.3268	0.6632	0.6327	0.5128	0.7749	0.3101	0.3817
2013	0.5830	0.5179	0.7925	0.2905	0.6264	0.5975	0.5128	0.7749	0.2584	0.3393
2014	0.5441	0.4834	0.7925	0.2518	0.5846	0.5975	0.5128	0.7749	0.2067	0.2940
2015	0.4988	0.4431	0.7265	0.2098	0.5359	0.5477	0.5128	0.7749	0.1551	0.2450
2016	0.4433	0.3447	0.7265	0.1632	0.4764	0.5477	0.4558	0.7749	0.1034	0.1906
2017	0.3695	0.2298	0.7265	0.1088	0.3970	0.5477	0.3798	0.7749	0.0517	0.1271
2018	0.2463	0.0766	0.7265	0.0363	0.2647	0.5477	0.3798	0.7749	0.000	0.0424

Source: Own editing based on World Bank (2019) data

Table 7. Kaplan-Meier survival rates for Balassa indices by products (1993-2018)

Year	Survival function for all three products	Orange	Frozen orange juice	Orange juice without freezing
1993	0.9869	0.9852	0.9865	0.9891
1994	0.9684	0.9664	0.9653	0.9733
1995	0.9463	0.9432	0.941	0.9545
1996	0.9223	0.9187	0.9155	0.9323
1997	0.8963	0.8931	0.8879	0.9074
1998	0.8689	0.867	0.8597	0.8796
1999	0.8387	0.838	0.8278	0.8495
2000	0.8045	0.8039	0.7926	0.8164
2001	0.7694	0.7694	0.7559	0.7823
2002	0.7331	0.7335	0.7205	0.7446
2003	0.6952	0.6968	0.6821	0.706
2004	0.6561	0.6577	0.6418	0.668

Table 7. Continued

2005	0.6168	0.6193	0.6019	0.6285
2006	0.5777	0.5802	0.5628	0.5893
2007	0.5353	0.5399	0.5184	0.5468
2008	0.4936	0.4996	0.4764	0.5039
2009	0.4512	0.4575	0.4365	0.4587
2010	0.4080	0.4135	0.3955	0.4143
2011	0.3647	0.3693	0.3548	0.3695
2012	0.3184	0.3227	0.3099	0.322
2013	0.2708	0.2753	0.2635	0.2733
2014	0.2226	0.2264	0.2168	0.2243
2015	0.1732	0.177	0.1686	0.1739
2016	0.1221	0.1258	0.1189	0.1216
2017	0.0678	0.0699	0.0647	0.0686
2018	0.0110	0.0112	0.0109	0.0109

Source: Own editing based on World Bank (2019) data

Costa Rica (Table 5). In addition, the Balassa index of Belgium, the Netherlands and Spain shows a value above 1 in all periods, while the other countries show a constant change.

After static analysis, the durability of the results is examined using Kaplan-Meier survival rates (Table 6). The values vary greatly from country to country over the period, but for each country it is clear that the durability of trade in fresh fruit and orange juice has steadily declined towards the end of the period. From an estimated 97-99 percent survival chances at the beginning of the period to 2018, the durability of comparative advantages has fallen to 0-37 percent, suggesting strong competition for different regions in international orange trade. On this basis, at the regional level, emerging countries in orange trade have an increasing market share, generating more competition with neighbouring countries (for example, Mexico in the case of Brazil and Morocco, Greece and Turkey in the case of Egypt). By the end of the analysed period, the values of Spain, Greece and the Netherlands show greater durability, with estimated survival chances above 50 percent.

As to the product level, we can draw a similar conclusion as for countries. Estimates of 98 to 99 percent at the beginning of the 1993–2018 periods for all commodities fell to 1 percent by the end of the last year (Table 7). Thus, the strengthening of competition can be observed both for the countries and for the products in the analysed period.

Conclusions

Originating from China, an orange bred from an alloy of pomelo and mandarin is one of the most widely grown and consumed fruits in the world today. The paper examined the situation of global orange production and trade, as well as its key players, based on the revealed comparative advantages for the period 1993-2018. During this period, global orange trade has been growing steadily, but only to a lesser extent than total and agricultural trade. The growth is clearly due to population growth, technological advances and increasing globalization. Although fruit production is territorially limited, as it requires a subtropical climate, lower concentrations can be observed for each country when production is considered. The American continent is the largest orange grower with Brazil and the United States at the forefront (40.4 percent), although the fruit originally came from ancient China.

Like cultivation, the global orange exports, led by Spain, South Africa and the United States, are not considered concentrated. In contrast, in terms of orange juice exports, a high concentration can be observed during the period in which Brazil accounts for 50-60 percent of the market, followed by the United States and the Netherlands. This also holds true for the share of orange imports.

For the static analysis of competitiveness for global orange trade, we used the Balassa index, suggesting the highest comparative advantage of the largest producing country (Brazil) in terms of orange juice. In contrast, in

the case of fresh fruit, Egypt, South Africa, Greece, Morocco, and Spain also overtook Brazil in terms of comparative advantages. Further examination of these results shows that Kaplan-Meier survival rates generally show declining values by country and product, implying increasing competition in global orange trade.

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Annex 1. World's largest exporters of orange juice (frozen) as a percentage of total orange juice (frozen) exports (1993-2018)

1993-1996		1997-2003		2004-2010		2011-2018	
Brazil	63.1%	Brazil	57.0%	Brazil	63.3%	Brazil	50.4%
Netherlands	17.6%	Netherlands	10.7%	United States	7.5%	Mexico	16.2%
United States	9.2%	Belgium	8.4%	Mexico	7.2%	United States	7.7%
Mexico	2.8%	United States	7.3%	Italy	4.4%	Netherlands	4.4%
Italy	1.1%	Mexico	2.7%	Netherlands	2.8%	Italy	3.9%
Morocco	0.6%	Italy	1.8%	Belize	2.7%	Spain	2.5%
Spain	0.3%	Cuba	1.1%	Spain	2.2%	Belize	2.3%
Germany	0.3%	Belize	0.9%	Belgium	1.4%	Israel	1.5%
United Kingdom	0.3%	Spain	0.7%	Ireland	0.8%	Belgium	0.9%
Argentína	0.2%	South Africa	0.4%	Germany	0.6%	Ireland	0.7%
TOP10	96%		91%		93%		90%

Source: Own composition based on World Bank (2019) data

Annex 2. World's largest exporters of orange juice (non-frozen) as a percentage of total orange juice (non-frozen) exports (1993-2018)

1993-1996		1997-2003		2004-2010		2011-2018	
Germany	29%	Germany	21%	Belgium	28%	Brazil	29%
United States	17%	Belgium	17%	Brazil	21%	Belgium	23%
Spain	9%	United States	12%	Netherlands	12%	Netherlands	14%
Netherlands	5%	Spain	8%	Germany	9%	Germany	7%
Israel	3%	Brazil	6%	United States	7%	United States	6%
Belize	3%	Netherlands	6%	Spain	5%	Spain	4%
France	2%	France	5%	France	2%	France	1%
Austria	2%	Ireland	4%	Switzerland	2%	United Kingdom	1%
United Kingdom	2%	Costa Rica	2%	Costa Rica	2%	Costa Rica	1%
Ireland	2%	Switzerland	2%	Austria	1%	Denmark	1%
TOP10	74%		84%		88%		88%

Source: Own composition based on World Bank (2019) data

Annex 3. World's largest importers of orange juice (frozen) as a percentage of total orange juice (frozen) imports (1993-2018)

1993-1996		1997-2003		2004-2010		2011-2018	
Netherlands	19%	United States	13%	United States	18%	United States	20%
Germany	17%	Germany	12%	Germany	12%	Germany	10%
United States	15%	Netherlands	12%	France	6%	China	7%
United Kingdom	9%	France	7%	United Kingdom	6%	France	7%
Japan	6%	Belgium	7%	Canada	5%	Japan	6%
Canada	5%	United Kingdom	6%	Japan	5%	Canada	5%
France	5%	Japan	4%	China	5%	Netherlands	3%
South Korea	4%	Canada	4%	Russia	4%	Australia	3%
Sweden	2%	South Korea	3%	Australia	3%	Russia	2%
Norway	1%	Australia	1%	South Korea	3%	South Korea	2%
TOP10	84%		68%		68%		65%

Source: Own composition based on World Bank (2019) data

Annex 4. World's largest importers of orange juice (non-frozen) as a percentage of total orange juice (non-frozen) imports (1993-2018)

1993-1996		1997-2003		2004-2010		2011-2018	
France	20%	France	13%	Belgium	14%	Belgium	13%
Canada	11%	Belgium	10%	United Kingdom	10%	Netherlands	12%
United Kingdom	9%	Netherlands	9%	Netherlands	10%	France	8%
Netherlands	9%	United Kingdom	8%	France	9%	United Kingdom	7%
Japan	7%	Canada	8%	Germany	7%	Germany	7%
Germany	6%	Germany	6%	Canada	4%	United States	4%
Switzerland	4%	Japan	3%	United States	2%	Canada	4%
Saudi Arabia	4%	Spain	2%	Spain	2%	Japan	2%
Czech Republic	2%	Switzerland	2%	Japan	2%	Spain	1%
Austria	2%	Saudi Arabia	2%	Poland	1%	Poland	1%
TOP10	74%		63%		60%		61%

Source: Own composition based on World Bank (2019) data