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Competitiveness in the trade of spices: A global evidence

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Abstract

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Comparative advantage is an important indicator in the analysis of international trade flow, however, in empirical studies on agriculture it is often neglected. In this article we aim to analyse comparative advantage in global spices trade and to test stability of trade indices as well as to identify the determinants behind different country performances. Our paper draws global spices trade data from the period 1991 to 2015. Results suggest that global spice trade is pretty much concentrated in Guatemala, Sri Lanka and India obtaining the highest comparative advantages in 1991-2015. However, duration and stability tests indicate that trade advantages have weakened for the majority of the countries concerned.

Keywords: global spice trade; comparative advantage; determinants

Introduction

Competitiveness is one of the most used and abused 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. Since this seminal work, a vast amount of literature is dedicated to the analyses of revealed comparative advantages of global trade.

Despite the apparent importance of the topic, however, the majority of studies are focused on industrial products, while agri-food sectors are usually neglected in empirical works. The main reason is probably that agricultural markets are usually assumed to be perfectly competitive. The article analyses revealed comparative advantages in global spices trade – this approach, at least to our knowledge, is currently missing from the literature. This paper, therefore, contributes to the existing literature in three ways. First: it applies the theory of revealed comparative advantages on an 'exotic' agricultural product group. Second: it analyses a product which is important from a development economic perspective as spices are mainly produced and exported by developing countries. Third: the article aims to identify the factors lying behind comparative advantages.

The article is structured as follows: Section 2 presents an overview of the empirical literature, followed by a demonstration of methodology and data used. Section 4 summarizes the descriptive statistics of global spices trade, identifying key players and products. Section 5 describes the comparative advantage patterns of the major exporters together with stability test for analyzing the duration of their advantages, while the last section concludes.

Empirical evidence

The analysis of comparative advantages of agricultural and food products is limited in the international literature. In a regional context, Chingarande et al. (2013) investigated the comparative advantage of the East-African Community

(EAC) Member States and found advantage for some agricultural products such as green tea, coffee, ivory, fish fillet, and flowers. Similarly, Ndayitwayeko et al. (2014) analyzed the comparative advantage of the Eastern and Central African (EAC) coffee sector and revealed that EAC countries, though to a diminishing extent, had comparative advantage in global coffee exports from 2000 to 2012, with Uganda and Kenya leading the group.

In Asia, Kuldilok et al. (2013) found a halt in the decline of Thailand's tuna market share in global trade. Akmal et al. (2014) analyzed the competitiveness of Pakistan's basmati rice exports and found that the country was losing its position to world markets in one of its biggest export products, calling for a change in its trade strategy. Astaneh et al. (2014) searched for comparative advantage in Iran's stone fruits market and found that the country had strengthened it competitive positions, though it lacked comparative advantage in the majority of the years analyzed.

In Europe, Bojnec and Fertő (2014) analyzed the competitiveness of agri-food exports of European countries, and found majority of countries and products to have an advantage globally. The most successful nations in this regard were the Netherlands, France and Spain. The article also predicted a longer lasting advantage for Western-European countries, compared to Eastern-European ones. Fertő (2008) analyzed the evolution of agri-food trade patterns in Central European Countries and found the trade specialization across the region to be mixed. For particular product groups, greater variation was observed, with stable (unstable) patterns for product groups with comparative disadvantage (advantage). Török and Jámbor (2013) also analyzed the agri-food trade patterns of New Member States, and highlighted that almost all countries experienced a decrease in their comparative advantage after the EU accession, though it still remained at an acceptable level for most cases.

In Latin America and the Caribbean, McLean et al. (2014) investigated regional integration in the Caribbean and found many countries and products to have a comparative advantage and potential to prosper. Korinek and Melatos (2009) analyzed revealed comparative advantages of MERCOSUR countries and found margarine, vegetable oils and coffee as the most competitive products in 1988 to 2004. In particular, Brazil and Argentina are leaders in comparative advantage in beef, both in fresh and preserved form.

In North America, Málaga and Williams (2006) found a lack of comparative advantage in agricultural and food export in Mexico. At the product group level, however, results suggested vegetables and fruits to have competitive positions. However, this competitiveness was decreasing for vegetables and increasing for fruits with time. Sparling and Thompson (2011) investigated the Canadian agri-food sector and concluded that despite its overall competitiveness, the country was losing its position in food processing. Sarker and Ratnasena (2014) analyzed the comparative advantages of Canadian wheat, beef and pork sectors between 1961 and 2011, and found only the wheat sector to be competitive.

Disdier al. (2015) analyzed comparative advantages of agri-food products in the Asian and Pacific region and found that Australia and New Zealand had strong comparative advantages in fruit and vegetables, beverages and the dairy market. This was partly due to the opening of some of their important but overly protected markets (e.g. Canada and Japan). Linehan et al. (2012) also found that Australia has had a strong comparative advantage in her agricultural sector and especially in grains, beef and semi-prepared foods.

On a product basis, we have not found any article analyzing the competitiveness of spices in international trade.

Methodology

As discussed in the theoretical framework, probably the most well-known index analyzing trade-based competitiveness of nations is Revealed Comparative Advantage (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) as follows:

$$\mathrm{RCA}_{ij} = \left(\frac{X_{ij}}{X_{it}}\right) / \left(\frac{X_{nj}}{X_{nt}}\right), \tag{1}$$

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 > 1, a given country has a comparative advantage compared to the reference countries, or in contrast, it has a revealed comparative disadvantage if RCA < 1. Although the Balassa RCA-index is criticized from many aspects, it is beyond the scope of this paper to go into details – see Jambor and Babu (2016) for a thorough review on this issue.

The paper also checks the stability and duration of the RCA index in two steps. First, Markov transition probability matrices are calculated and then summarized by using the mobility index, evaluating the mobility across countries and time. Second, following Bojnec and Fertő (2008), survival function S(t) can be estimated by using the non-parametric Kaplan-Meier product limit estimator, pertaining to the prod-

uct level distribution analysis of the RSCA index. Following Bojnec and Fertő (2008), 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 failure occurred, and 0 otherwise) of observation *i.* It is assumed that there are m < n recorded times of failure. We denote the rank-ordered survival times as t(1) < t(2) < … < t(m). For the purpose of our analysis 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)) as follows:

$$\hat{S}(t) = \prod_{t(i)<t} \frac{nj - dj}{nj}. \quad (2)$$

In order to calculate indices above, the article uses the World Bank WITS software based on COMTRADE, an international trade database developed by the United Nations at the HS six-digit level as a source of raw data. Spice trade is defined as trade in the following products. The chapter works with trade data for the period of 1991 to 2015.

However, we are aware that the methodology above has a number of limitations. First, trade data is not fully reliable due to various reasons. These include the following: trade values may not necessarily sum up to the total trade value for a given country dataset; countries may not necessarily report their trade values for each and every year; trade data may differ by the selection of classification; and imports reported by one country may not coincide with exports reported by its trading partner. Second, Balassa-based indices are sensitive to zero values (see equation 1, for instance). Third, outliers in results get omitted, dropping inconsistent indices and some useful data. However, based on the literature review and previous empirical works, our results well fit into past findings.

Global spice trade patterns

Global spice trade has been continuously increasing in the previous 25 years (Figure 1). In 2015, for instance, the world traded 8 times more spices ($38 billion) than it did in 1991 ($7 billion), which can be attributed mostly to the growing population (in 2015 the world population almost reached 7.5 billion while in 1991 it was 5.3 billion). This growth was mainly in line with that of agricultural and all products, also showing a significantly increasing trend with total merchandize trade growing faster. This was primarily due to overall relatively higher increase in production of merchandize products as compared to, agricultural and food products. Further, a significant decline in transport and transaction costs has also contributed to this trend.

The analysis of trade in global spices by country gives further insights to the trends above. Ten countries gave the vast majority of global spices trade in the period analysed with changing concentration patterns. As evident from Table 1, India, China and Vietnam were the biggest spice exporters in the world in 2011-2015, accounting for 38% of global spices trade. The case of Vietnam should be highlighted here as an example: from 1991 to 2000, Vietnam was missing from the list of biggest spice exporters, while it was among the three biggest between 2006 and 2015 with continuously growing positions, mainly due to pepper exports. Note that between 1991 and 2014, the Vietnamese pepper production has increased 15 times (FAO, 2016).

Over the last decade, India also has had a significant and growing share in spice exports thanks to its virtual monopoly on spice oils made from tropical aromatics but is also one of the biggest exporters of cumin, paprika and spice mixtures. China, Vietnam and Indonesia are located at the same climate zone so they have very similar and intensive flavoured cuisines based on spices. Rice is the main staple food and is

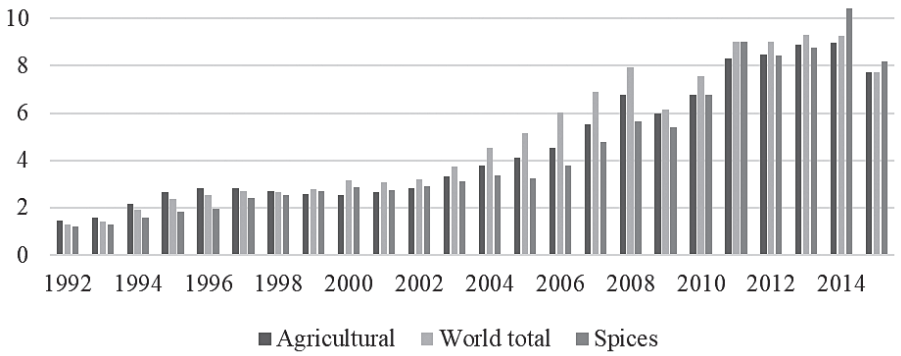

Fig. 1. The evolution of global trade of spices, agricultural and all products, 1992-2015 (1991 = 1), nominal trade value
Source: Own composition based on World Bank WITS (2016) database

Table 1
Top spice exporters in the world, 1991-2015, in percentage of total spice export (nominal value)

1991-1995		1996-2000		2001-2005		2006-2010		2011-2015	
Indonesia	14%	Singapore	13%	China	10%	India	14%	India	18%
Singapore	12%	India	13%	India	8%	China	11%	China	10%
India	12%	Indonesia	12%	Madagascar	6%	Vietnam	7%	Vietnam	10%
China	9%	China	8%	Indonesia	6%	Indonesia	6%	Indonesia	6%
Spain	6%	Netherlands	5%	Singapore	5%	Guatemala	4%	Netherlands	5%
Germany	5%	Malaysia	4%	Vietnam	5%	Netherlands	4%	Singapore	4%
Madagascar	5%	Brazil	4%	Germany	4%	Germany	4%	Germany	4%
Brazil	4%	Spain	4%	Netherlands	4%	Spain	4%	Brazil	4%
Netherlands	4%	Germany	4%	Brazil	3%	Brazil	3%	Sri Lanka	3%
United States	3%	Turkey	3%	Spain	3%	Sri Lanka	3%	Guatemala	3%
TOP10	74%		70%		54%		60%		67%

Source: Own composition based on World Bank WITS (2016) database

Table 2
Top spice importers, 1991-2015, in percentage of total spice import (nominal value)

1991-1995		1996-2000		2001-2005		2006-2010		2011-2015	
United States	22%	United States	19%	United States	17%	United States	13%	United States	15%
Japan	10%	Japan	9%	Japan	6%	Germany	6%	Germany	6%
Germany	9%	Germany	7%	Germany	6%	Japan	5%	India	4%
Singapore	8%	Singapore	7%	Singapore	5%	United Kingdom	3%	Netherlands	4%
Saudi Arabia	4%	Netherlands	5%	France	4%	Malaysia	3%	Japan	4%
Spain	4%	France	4%	Netherlands	4%	Netherlands	3%	Saudi Arabia	4%
Netherlands	4%	United Kingdom	4%	United Kingdom	3%	Spain	3%	United Kingdom	4%
Canada	3%	Spain	3%	India	3%	India	3%	Singapore	3%
United Kingdom	3%	Saudi Arabia	2%	Spain	3%	Saudi Arabia	3%	Spain	3%
Mexico	3%	Canada	2%	Saudi Arabia	3%	Singapore	3%	France	3%
TOP10	70%		62%		54%		45%		50%

Source: Own composition based on World Bank database (2016)

Table 3
Top spice export products in the world, 1991-2015, in percentage of total spice export (nominal value)

1991-1995		1996-2000		2001-2005		2006-2010		2011-2015	
Anise or badian	27%	Anise or badian	37%	Caraway	17%	Caraway	19%	Anise or badian	24%
Caraway	18%	Caraway	14%	Anise or badian	17%	Anise or badian	19%	Caraway	17%
Spice mix	8%	Cardamons	7%	Spice mix	10%	Cardamons	9%	Cardamons	9%
Curry	6%	Ginger	6%	Ginger	8%	Ginger	9%	Ginger	8%
Cardamons	6%	Thyme	4%	Cardamons	7%	Thyme	6%	Cumin	5%
Ginger	6%	Fennel and juniper berries	4%	Cumin	6%	Curcuma	5%	Capsicum or Pimenta	5%
Thyme	4%	Nutmeg	3%	Thyme	4%	Nutmeg	5%	Thyme	5%
Nutmeg	3%	Capsicum or Pimenta	3%	Nutmeg	4%	Capsicum or Pimenta	4%	Nutmeg	5%
Cumin	2%	Curry	3%	Curcuma	4%	Fennel and juniper berries	4%	Curcuma	4%
Cinnamon	2%	Spice mix	3%	Fennel and juniper berries	4%	Pepper, crushed or ground	3%	Fennel and juniper berries	3%
TOP10	82%		84%		81%		83%		85%

Source: Own composition based on World Bank database (2016)

Table 4
Top spice import products in the world, 1991-2015, in percentage of total spice import (nominal value)

1991-1995		1996-2000		2001-2005		2006-2010		2011-2015	
Capsicum or Pimenta	20%	Dried pepper	32%	Capsicum or Pimenta	19%	Capsicum or Pimenta	20%	Dried pepper	24%
Dried pepper	19%	Capsicum or Pimenta	16%	Dried pepper	16%	Dried pepper	18%	Capsicum or Pimenta	15%
Vanilla	8%	Ginger	7%	Vanilla	11%	Other spices, nes	10%	Ginger	9%
Ginger	8%	Other spices, nes	5%	Ginger	8%	Ginger	8%	Other spices, nes	8%
Cinnamon	8%	Cinnamon	5%	Other spices, nes	7%	Spice mix	5%	Pepper, crushed or ground	7%
Other spices, nes	6%	Vanilla	4%	Cardamons	5%	Cardamons	5%	Cloves	5%
Cumin	5%	Cardamons	4%	Cloves	5%	Pepper, crushed or ground	5%	Spice mix	5%
Cardamons	4%	Pepper, crushed or ground	3%	Spice mix	5%	Cumin	4%	Cardamons	4%
Spice mix	2%	Cumin	3%	Cinnamon	4%	Cinnamon	4%	Cinnamon	4%
Cloves	2%	Spice mix	3%	Cumin	4%	Saffron	4%	Cumin	3%
TOP10	82%		82%		84%		83%		84%

Source: Own composition based on World Bank database (2016)

served with side dishes of meat and vegetables. Their fundamental, major ingredients are pepper, paprika, cumin, spice mixtures and cardamom (Matthews and Jack, 2011).

As for global spice imports, the United States, Germany and Japan were leading the line in the majority of the period analysed with India being the third in the last sub-period. The concentration of the ten biggest spice importers of the world has continuously been decreasing together with the changes of the countries in the list. Note that the overall concentration of spice imports is lower than that of spice exports, suggesting diversified import patterns.

The list of biggest spice importers is also related to the overall level of development, suggesting it is mainly the developed economies that are importing, while developing countries are exporting spices. Moreover, the case of the Netherlands or Germany also suggest that without being a typical producer, the procurement of raw materials together with their conversion to high value added processed spices can result in leading export positions.

The product structure of global spices trade is also worth to be investigated (Table 3). In 2011-2015, the biggest spice export products were anise or badian, caraway, cardamoms, ginger and cumin, altogether giving 63% of global spices trade, suggesting a high level of concentration (TOP10 products gave 85% in the same period). The product structure of global spice exports has changed little over time. Concentration of these products are also high by country – for instance, Guatemala, India, Nepal, Singapore and Indonesia exported 93% of world's cardamom in 2011-2015. It is almost the

Table 5
Revealed comparative advantage of global spices trade by the Balassa index, 1991-2015, by country

Country	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015
Brazil	1.27	1.31	1.80	1.17	1.09
China	1.54	1.38	1.17	0.79	0.58
Germany	0.27	0.31	0.28	0.29	0.33
Guatemala	59.50	51.09	74.46	65.96	44.08
India	12.44	12.78	9.79	7.71	6.43
Indonesia	3.83	3.05	2.23	1.93	1.65
Netherlands	0.43	0.56	0.61	0.80	0.99
Singapore	2.14	1.86	1.33	0.89	0.85
Sri Lanka	5.35	6.20	9.98	15.49	13.11
Vietnam	0.00	2.57	4.74	4.88	4.37

Source: Own composition based on World Bank database (2016)

Table 6
Revealed comparative advantage of global spices trade by the Balassa index, 1991-2015, by product

Product	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015
Dried pepper	4.17	4.51	7.71	7.52	7.77
Pepper, crushed or ground	1.02	1.01	1.79	3.59	3.01
Capsicum or Pimenta	0.00	1.90	1.47	1.46	1.40
Vanilla	1.59	1.34	0.66	0.81	0.69
Cloves	3.77	3.62	9.13	13.47	9.48
Cardamons	48.20	63.88	78.57	78.86	56.65
Seeds of cumin	11.35	10.74	8.83	6.25	5.97
Ginger	3.00	2.10	1.10	0.75	0.80
Spice mixtures	1.27	1.31	1.04	1.04	1.14
Other spices	2.41	1.90	1.70	1.32	1.25

Source: Own composition based on World Bank database (2016)

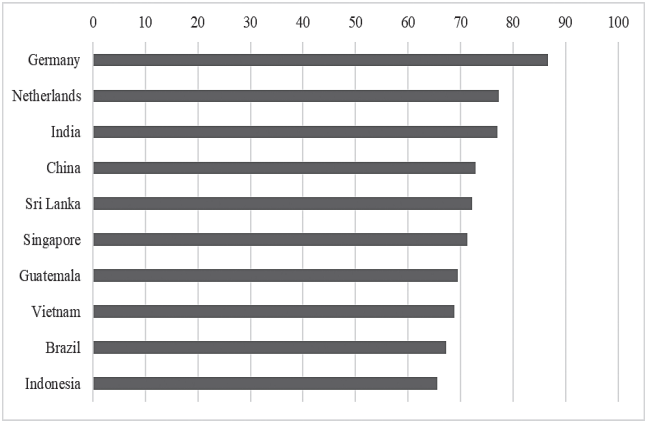

Fig. 2. The mobility of Balassa indices, 1991-2015, by country, %

Source: Own composition based on World Bank database (2016)

same situation with paprika, ginger, cloves and vanilla, coming from relatively few countries.

Regarding global spice import by product (Table 4), dried pepper, capsicum or pimenta, ginger, pepper and other spices took the lead in 2011-2015, giving 63% of global spices import (TOP10 gave 84% in the same period). Similarly, to exports, the product structure of imports has changed little over time.

Given these trends, the rest of the article concentrates on TOP10 major spice exporters and products, representing the vast majority of respective global trade.

The specialisation of global spices trade

With calculation of Balassa indices, the specialisation of global spices trade becomes apparent (Table 5). The paper only focuses on the original Balassa index due to high correlations (not presented here) among different indices. It is obvious that Guatemala, Sri Lanka and India had the highest Balassa indices

Table 7

Kaplan-Meier survival rates for Balassa indices and tests for equality of survival functions in global spices trade, by most exported product, 1991–2015

Years	Survivor function	Dried pepper	Pepper	Capsicum or Pimenta	Vanilla	Cloves	Cardamons	Cumin	Ginger	Spice mixtures	Other spices
1991	0.9878	0.9959	0.9878	0.9799	0.9837	0.9837	0.9918	0.9918	0.9919	0.984	0.9837
1992	0.9688	0.9833	0.9709	0.9511	0.9586	0.9671	0.9747	0.975	0.975	0.9635	0.9629
1993	0.9458	0.9702	0.9451	0.9218	0.933	0.9371	0.9485	0.9576	0.9577	0.9384	0.9373
1994	0.9234	0.9523	0.9275	0.8962	0.8983	0.9111	0.9307	0.9398	0.9355	0.9170	0.9156
1995	0.9014	0.9338	0.9048	0.8744	0.8764	0.8801	0.9078	0.9215	0.9173	0.8952	0.889
1996	0.8789	0.9148	0.8818	0.8522	0.8495	0.8533	0.8844	0.9027	0.8986	0.8728	0.8619
1997	0.8559	0.8953	0.8582	0.8296	0.8223	0.8215	0.8605	0.8835	0.8794	0.8544	0.8344
1998	0.8315	0.8753	0.8293	0.8017	0.7947	0.7940	0.836	0.8637	0.8597	0.8307	0.8064
1999	0.8057	0.8599	0.8047	0.7735	0.762	0.7753	0.8110	0.8383	0.8344	0.8014	0.7732
2000	0.7721	0.8384	0.7744	0.7444	0.7191	0.7414	0.7800	0.8016	0.8030	0.7663	0.7297
2001	0.7402	0.816	0.7432	0.7147	0.6808	0.7117	0.7482	0.7696	0.7708	0.7357	0.6908
2002	0.7084	0.7985	0.7164	0.6789	0.6419	0.6812	0.7099	0.7366	0.7376	0.7147	0.6513
2003	0.6771	0.7740	0.6999	0.6424	0.6073	0.655	0.6708	0.7083	0.7034	0.6817	0.6163
2004	0.6452	0.7546	0.6766	0.6103	0.5719	0.6223	0.6421	0.6846	0.6622	0.6533	0.5752
2005	0.6083	0.7272	0.6397	0.5714	0.5303	0.5883	0.6121	0.6535	0.6138	0.6236	0.5386
2006	0.5700	0.6981	0.6077	0.5257	0.4932	0.553	0.5806	0.6143	0.5707	0.5862	0.4955
2007	0.5301	0.6671	0.5807	0.4790	0.4548	0.5162	0.5339	0.5802	0.526	0.5406	0.4569
2008	0.4847	0.6337	0.5371	0.4311	0.4207	0.4775	0.4992	0.5294	0.4665	0.4933	0.4113
2009	0.4335	0.5885	0.4834	0.388	0.3726	0.4365	0.4396	0.4765	0.4061	0.4439	0.3643
2010	0.3852	0.5394	0.4351	0.3298	0.3416	0.3929	0.4010	0.4209	0.3515	0.3922	0.3218
2011	0.3344	0.4963	0.3829	0.2704	0.3074	0.3300	0.3584	0.3704	0.3018	0.3373	0.2703
2012	0.2809	0.4342	0.3254	0.2096	0.2767	0.2723	0.3112	0.3056	0.2559	0.2782	0.2162
2013	0.2199	0.3763	0.2712	0.1467	0.2306	0.2178	0.2556	0.2445	0.1865	0.2133	0.1586
2014	0.1503	0.3011	0.217	0.0807	0.1499	0.1525	0.1884	0.1589	0.1291	0.1387	0.0951
2015	0.0703	0.1806	0.1302	0.0242	0.03	0.0762	0.113	0.0794	0.0612	0.0693	0.0381

Source: Own composition based on World Bank database (2016)

in the period analysed, while six countries out of the ten biggest exporters had a comparative advantage in 2011-2015. Indonesia and Singapore experienced the biggest fall in the period analysed, while Germany and the Netherlands had a comparative disadvantage in global spices trade, despite being one of the biggest exporters. Between 1991 and 2015 the TOP10 gave more than 80 percent of global spice trade.

When analysing comparative advantages by product, further specialisation patterns become available (Table 6). It is apparent that cardamoms have the highest comparative advantages in among product groups, followed by cloves, dried pepper and cumin seeds. Consequently, countries exporting these products (Guatemala – cardamon, Sri Lanka – pepper, India – cumin) had the highest comparative advantages, while concentrating on the export of other spices have not proved to be beneficial.

The degree of mobility in Balassa indices is estimated by using the mobility index based on the Markov transition probability matrices (Figure 2). Results show a relatively low mobility of the Balassa index in global spices trade for Germany, the Netherlands and India, suggesting stable patterns of comparative (dis)advantages. Besides these countries, more than 70% of product groups with a comparative advantage remained persistent for China, Sri Lanka and Singapore, while lowest mobility measures pertained to Guatemala, Vietnam, Brazil and Indonesia, implying highly changing competitive potentials (in line with results observable in Table 5).

Regarding the duration of revealed comparative advantages in global spice exports, the non-parametric Kaplan-Meier product limit estimator was estimated. As described in the methodology section, equation 9 was run on our panel dataset and results confirm that in general the survival times are not persistent over the period analysed (Table 7). Survival chances of 99% at the beginning of the period fell to 2-18% by the end of the period, suggesting that fierce competition exists in global spices trade. Results vary by product, though the highest survival times exist for dried pepper and the lowest for Capsicum or Pimenta. The equality of the survival functions across the top 10 countries can be checked using two non-parametric tests (Wilcoxon and log-rank tests). Results of the tests show 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 spice exporters are absent (Table 7).

Conclusions

The patterns and stability of comparative advantage in global spices trade were analysed in the paper, generating a number of conclusions. First, our results indicate that global spice trade has been continuously increasing in the previous 25 years with a high concentration on both the export and import sides by country and by product. India, China and Vietnam were the biggest spice exporters in the world in 2011-2015, while the United States, Germany and Japan were leading the line in global spice imports. Most traded products were anise or badian, caraway, cardamoms, ginger and cumin, altogether giving 63% of global spices trade in 2011-2015, suggesting a high level of concentration (TOP10 products gave 85% in the same period).

Second, our results also suggest that Guatemala, Sri Lanka and India had the highest comparative advantages in the period analysed, while at the product level, cardamoms led the line, followed by cloves, dried pepper and cumin seeds. It seems evident that countries concentrated on the export of these products were the most competitive in global spice markets. Third, duration and stability tests indicated that trade advantages had weakened for the majority of the countries concerned.

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Appendix 1. Spice product codes and associated descriptions at the HS6 level

HS6 Product code	Description
090411	Dried pepper (exc. crushed nor ground)
090412	Pepper, crushed or ground
090420	Fruits of the genus Capsicum or Pimenta, dried, neither crushed nor ground
090500	Vanilla
090610	Cinnamon, neither crushed nor ground
090620	Cinnamon and cinnamon-tree flowers, crushed or ground
090700	Cloves (whole fruit, cloves and stems)
090810	Nutmeg
090820	Mace
090830	Cardamons
090910	Seeds of anise or badian
090920	Seeds of coriander
090930	Seeds of cumin
090940	Seeds of caraway
090950	Seeds of fennel; juniper berries
091010	Ginger
091020	Saffron
091030	Turmeric (curcuma)
091040	Thyme, bay leaves
091050	Curry
091091	Spice mixtures
091099	Other spices, nes

Source: Own composition based on World Bank database (2016)

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