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Export Competitiveness of Türkiye Agri-food Products in the European Union and The Shanghai Cooperation Markets

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ABSTRACT

The purpose of this study was to investigate the competitive advantage and long-term viability of Türkiye agri-food exports to the European Union (EU) and Shanghai Cooperation Organization (SCO) markets. The Lafay index and trade ratios were utilized to investigate comparative and competitive advantage, while the survival function was employed to estimate export competition for the EU and SCO markets. The results indicate that Türkiye has a competitive edge in the export of fruits and vegetables to the EU and SCO states. However, the period of comparative advantage experienced by EU and SCO countries was not similar, nor was the benefit consistent. Despite fluctuations in Türkiye's international trade balance with SCO members, its foreign trade with EU members has increased. Hence, Türkiye should continue to trade in agri-food with the EU while simultaneously expanding business networks with SCO countries.

Keywords: Survival analysis, Comparative advantage, Agri-food products, Export-import ratio

1. Introduction

The agricultural sector is relatively important to the Turkish economy but its share has declined in comparison to the growth of other sectors. Agriculture and food production, on the other hand, remain important components of Türkiye's economy and workforce. For instance, Türkiye is the world's leading exporter of nuts, raisins, dried apricots, and dried figs (Erdem 2020). Apart from that, Türkiye exports an enormous amount of fresh fruits and vegetables to Russia and other European Union (EU) countries. However, Türkiye imports agricultural products due to inadequate supply or excess demand. Türkiye's agri-food imports are primarily raw ingredients for the food sector. Because a country's resources are insufficient to cover all of its residents' requirements, it enters into diverse economic, political, and commercial partnerships with other countries. Opportunities entering the market through mutual customs tariff rate reductions, the removal of non-tariff barriers for agri-food products, and obtaining quotas for non-traded products have positive effects on foreign trade within the scope of cross-country agreements and economic cooperation organizations.

Türkiye and the EU had signed a commercial trade agreement (the Customs Union Agreement of 1996) in which agricultural products played a significant role. However, the relationship has deteriorated since 2005, when full membership negotiations with the EU were temporarily halted. Though Türkiye and the EU have cooperated for a long time, it is no longer sustainable due to views stressing people's previous prejudices and member countries' opposition to Türkiye's full membership. As a result, the Turkish government aspired to join the Shanghai Cooperation Organization (SCO), submitting a formal application in 2011 and being accepted a year later (Pantucci & Petersen 2013). Türkiye's agricultural food exports and imports are influenced by the SCO, which represents 45 percent of the world's population (Telatar 2019; Isik 2016). The SCO has broadened its collaboration among its members to include a wide range

of topics to help them grow and develop socially and culturally. With its friendship and good neighborly connections, the SCO strives to promote mutual trust and contribute to the member nations' economic progress and social-cultural development. In this context, the SCO has broadened its collaboration among its members to include a wide range of topics (Nakiboglu et al. 2017).

The international economic relationship, including long-term competitiveness between Türkiye, the European Union (EU), and the SCO was examined in this study to determine whether the SCO could be a viable option for the EU in the case of Turkish agricultural food products. It will provide the trade competitive advantage and long-term viability of Turkish agri-food exports with EU and SCO to increase agricultural foreign trade.

2. Material and Methods

2.1. Data

In this study, data about Türkiye's export and import of agri-food goods with the EU (28 nations), the SCO (12 countries), and other countries of the world for the years 2010-2018 were analysed. The analysis took into account export and import values, changes in trade volumes, historical balances, and trends. The analysis used the dollar to represent Türkiye's overseas trade in agri-food items and transaction values. These data covering the years from 2010-2018 were obtained from the Turkish Statistical Institute (TSI). In the TSI dataset, export and import statistics are classified as "free on board" and "cost", "insurance", and "freight-delivery" with insurance and freight. The product items were analyzed according to the 2-base international harmonized system classification, and the first 24 items covering agricultural food products were considered (Table 1).

Table 1- Agricultural sector chapters in the Harmonized System Classification

Code	***HS2 classification***
HS01	Live animals
HS02	Meat and edible meat offal
HS03	Fish and crustaceans, molluscs and other aquatic invertebrates
HS04	Dairy produce, birds' eggs, natural honey, edible products of animal origin not elsewhere specified or included
HS05	Products of animal origin, not elsewhere specified or included
HS06	Live trees and other plants, bulbs, roots and the like, cut flowers and ornamental foliage
HS07	Edible vegetables and certain roots and tubers
HS08	Edible fruit and nuts, peel of citrus or melons
HS09	Coffee, tea, mate and spices
HS10	Cereals
HS11	Products of the milling industry, malt, starches, inulin, wheat gluten
HS12	Oil seeds and oleaginous fruits, miscellaneous grains, seeds and fruit, industrial or medicinal plants, straw and fodder
HS13	Lac, gums, resins and other vegetable saps and extracts
HS14	Vegetable plaiting materials, vegetable products not elsewhere specified or included
HS15	Animal or vegetable fats and oils and their cleavage products, prepared edible fats, animal or vegetable waxes
HS16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates
HS17	Sugar and sugar confectionery
HS18	Cocoa and cocoa preparations
HS19	Preparations of cereals, flour, starch or milk, pastrycooks' products
HS20	Preparations of vegetables, fruit, nuts or other parts of plants
HS21	Miscellaneous edible preparations
HS22	Beverages, spirits and vinegar
HS23	Residues and waste from food industries, prepared animal fodder
HS24	Tobacco and manufactured tobacco substitutes

Source: TSI 2019.

2.2. Theoretical backgrounds

The Ricardian models propose that governments should better focus on developing food items with a comparative advantage when analyzing the competitiveness of agri-food sectors in the context of global or regional competition. As a result, the concept of comparative advantage would be used to determine a country's competitiveness. Lafay (1992) clarifies two key distinctions between comparative advantage and competitiveness. First, competitiveness is normally measured by comparing a product between countries, whereas comparative advantage is measured by comparing products within a country. Second, changes in macroeconomic variables have an impact on competitiveness.

2.3. Method of data analysis

The Lafay index (LFI) was adopted to identify the comparative advantages of Türkiye's agri-food exports to the EU, SCO, and other nations around the world (Lafay 1992). The LFI has an advantage in that it accounts for macroeconomic distortions (Balassa 1965; Balassa 1977; Balassa 1991). It also corrects a potential bias in other indices like the Balassa index, which can lead to erroneous conclusions about a country's trade competition when both exports and imports are considered. Furthermore, the LFI index provides an analysis of each product's position within each country's or group of nations' international trade structure.

$$LFI_j^i = 100\left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^{N}\left(x_j^i - m_j^i\right)}{\sum_{j=1}^{N}\left(x_j^i + m_j^i\right)}\right)\frac{x_j^i + m_j^i}{\sum_{j=1}^{N}\left(x_j^i + m_j^i\right)} \quad (1)$$

where x_j and m_j denote exports and imports of product j from a chosen trading partner, respectively.

The number of product items examined is denoted by the letter N. The index's positive values imply that a country has a comparative advantage in a particular item. An increase in the index value implies that the product or product group exported to the country where the trade is conducted has become more specialized. Negative LFI values, on the other hand, suggest that there is no competitive advantage or specialization (Zaghini 2003). The LFI examines a country's comparative advantage (disadvantage). In this index, values ranging from $-\infty$ to $+\infty$ were used. The export-import ratio provides information on a country's export and import relationships. The higher the ratio, the greater the country's export power. This ratio, which shows the percentage of imports (M_{yi}) covered by exports (x_{yi}), can also be used to compare trade performance across countries.

$$\text{Export/import coverage ratio (\%)} = \frac{X_{y_i}}{M_{y_i}} \times 100[\%] \quad (2)$$

Duration analysis was used to address the question, "What is the length of the comparative advantage period at the product level?" (Bojnec & Fertö 2009). The starting and ending years serve as reference points for evaluating dynamics. In the agri-food product groupings, survival functions based on the LFI index have been estimated. The product boundary estimator was used to estimate the non-parametric survival function St, by Kaplan and Meier (1958). Consider the following example: (t_i; c_i), i = 1,2,..., n has n distinct observations with I = 1,2,..., n. The survival time is t_i, and the censoring indicator variable C is c_i (it takes the value 1 if a failure occurs, otherwise it is 0). We assumed, however, that the recorded failure time was correct. As a result, sequential survival time is denoted by t(1) t(2) and t(m). The n_j denotes the subject number that is in danger of failing at t(j) and d(j), respectively. The Kaplan-Meier survival function estimator can be written as follows:

$$\prod_{t(i)<t} \frac{n_j - d_j}{n_j} \quad (3)$$

If t(1) is true, then s(t)=1 (Cleves et al. 2010). Because it includes information from both censored and uncensored observations, the Kaplan-Meier estimator is robust when numerous censored observations are considered. Furthermore, the log-rank test and the Wilcoxon test, both non-parametric tests, were used to evaluate the equality of survival functions for the LFI index in the agri-food product categories.

3. Results and Discussion

3.1. The export-import ratio, the volume of foreign trade, and the foreign trade balance

For the period between 2010 and 2018, Türkiye's agri-food exports increased around the world in general and to the EU and SCO in particular (Table 2). In comparison to the previous period, the value of Türkiye's agricultural exports of food commodities to other countries has increased. This export value climbed steadily until 2014, after which it remained stable. Exports to EU countries grew at a slower pace during the same period. In terms of exports to SCO countries, the growth pace seen up until 2015 is unlikely to continue in the next few years. Although EU exports accounted for a major portion of Türkiye's agri-food product exports until 2015, the EU's share of the country's agri-food product exports began to decline after that year. Only in 2016 did the share of agri-food exports to SCO drop significantly, with similar levels of exports reported in the previous years.

Table 2- Export value of Turkish agri-food products in the period of 2010-2018 (billions of dollars)

Years	*World*	*EU*	*%*	*SCO*	*%*
2010	12.040	4.494	37.322	1.396	11.594
2011	14.427	4.792	33.213	1.690	11.714
2012	15.251	4.643	30.443	1.629	10.684
2013	16.977	4.954	29.178	1.745	10.278
2014	17.995	5.558	30.889	1.856	10.312
2015	16.789	5.525	32.909	1.696	10.102
2016	16.249	5.097	31.368	1.161	7.147
2017	16.909	5.166	30.552	1.401	8.284
2018	17.673	5.292	29.945	1.530	8.658
Average Annual Growth (%)	5.1890	2.234		2.580	

Source: Own calculations based on the TSI dataset

Türkiye's agri-food product imports have fluctuated over the same period. These changes occurred in trade with the rest of the globe, the EU, and SCO countries over the course of several years (Table 3). It should be noted that the EU and SCO are moving in opposite directions when it comes to importing shares. Despite changes over time, Türkiye's trade with the rest of the world saw a large increase in the import value of agri-food goods by the end of the period. Agri-food imports from EU countries have shown a similar average growth pattern. After 2012, however, there was no equivalent surge in agri-food imports from SCO nations. The proportion of agri-food products imported from EU nations in global food imports declined by around 2%, while the proportion imported from SCO members increased by about 8%. However, it is worth noting that, by the end of the period, the import values of the EU and SCO countries are nearly identical.

Table 3- The import value of Turkish agri-food products from 2010 to 2018 (in billions of dollars)

Import	*World*	*EU*	*%*	*SCO*	*%*
2010	7.683	2.082	27.10	1.046	13.62
2011	10.961	3.192	29.12	1.411	12.87
2012	10.734	2.805	26.13	2.780	25.90
2013	11.200	2.698	24.09	2.569	22.94
2014	12.418	2.682	21.59	3.536	28.47
2015	11.243	2.839	25.25	2.709	24.09
2016	11.038	2.786	25.24	2.322	21.04
2017	12.666	3.312	26.15	2.484	19.61
2018	12.845	3.329	25.92	2.758	21.47
Average annual growth (%)	7.5860	7.517		17.785	

Source: Own calculations based on the TSI dataset

Türkiye's international trade balance in agri-food items was summarized in Table 4. According to the results, though there was a trend toward imports in international trade with the rest of the world, the EU, and SCO countries, the tendencies differed by the year. The trade balance with the rest of the world, which had fallen to $3.47 billion in 2011, rose in 2013 due to a growth in exports, stayed at comparable levels until 2017, and then declined in the following years. The export-import balance in the agri-food trade with EU countries fluctuated, and the trade balance went below $2 billion in 2018. Except for the first few years, the shift in the trade balance of agri-food items created with SCO countries can be understood as imports are constantly at the forefront (Isik 2016). This change peaked in 2014, and by the end of nine years, the balance was in a different direction than it was at the start of the period. Despite the fact that the three categories have changed over time, there is a consistent pattern in the agri-food products trade that favors imports.

Table 4- Türkiye's foreign trade balance for agri-food products from 2010 to 2018 (in billions of dollars)

Years	*World*	*EU*	*SCO*
2010	4.358	2.411	0.350
2011	3.466	1.600	0.279
2012	4.517	1.838	-1.151
2013	5.777	2.255	-0.824
2014	5.577	2.877	-1.680
2015	5.546	2.686	-1.012
2016	5.211	2.311	-1.161
2017	4.243	1.854	-1.084
2018	4.828	1.963	-1.227

Source: Own calculations based on the TSI dataset

According to the results presented in Table 5, notwithstanding fluctuations, Türkiye's foreign trade volume of agri-food products to the globe, the EU, and SCO member nations increased. In international commerce, agri-food goods peaked in 2014, then fell by 11% for two years before beginning to rise again. Trade relations with EU countries, in particular, have remained stable since 2011. A similar trend has been seen between the SCO countries and the rest of the globe, with improved agri-food trade links. Taking into account the trade volumes of agri-food products achieved through the SCO countries, certain structural elements of Türkiye's agri-food export-import trade can be derived by looking at the export-import ratios of the world, EU member countries, and SCO members separately. The high export-to-import ratio does not imply that Türkiye's exports to certain nations or groups of countries are particularly valuable. Türkiye's export-import ratio for products such as vegetables and fruits, malt and milling products, and meat and fish products was fairly high (Table 6a).

Table 5- Türkiye's foreign trade volume for agri-food products with the rest of the world, the EU, and the SCO from 2010 to 2018 (in billions of dollars)

Trade volume	*World*	*EU*	*SCO*
2010	19.723	6.576	2.442
2011	25.389	7.984	3.101
2012	25.985	7.448	4.410
2013	28.177	7.652	4.314
2014	30.413	8.240	5.391
2015	28.032	8.364	4.405
2016	27.287	7.883	3.484
2017	29.575	8.478	3.885
2018	30.518	8.621	4.288

Source: Own calculations based on the TSI dataset

Table 6a- The export-import ratio of Türkiye in the period of 2010-2018 (world)

HS	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*
01	2.20	0.60	0.96	3.89	19.10	10.68	4.62	2.86	3.28
02	83.15	75.98	547.95	2432.04	10341.44	415.92	882.94	621.37	219.87
03	233.83	227.34	234.42	279.86	325.59	264.96	426.40	357.26	475.95
04	236.57	460.08	467.86	414.11	380.22	360.07	538.46	579.33	581.87
05	88.17	81.16	112.53	131.89	124.06	106.58	108.16	93.64	100.73
06	112.65	112.39	107.85	83.23	89.35	95.14	93.55	103.00	164.15
07	351.14	290.67	344.63	318.96	232.34	228.08	206.27	191.03	281.08
08	1107.68	993.35	832.51	938.35	1040.49	937.48	716.61	691.21	703.68
09	100.07	93.62	87.16	108.58	110.88	84.33	90.69	55.80	67.81
10	33.05	5.70	11.25	8.78	5.40	6.53	8.93	6.47	5.08
11	1364.50	1628.33	1280.13	1178.32	1137.40	1096.67	1014.54	889.06	1000.28
12	11.73	13.54	14.26	16.75	11.30	10.61	20.49	14.82	17.56
13	14.58	18.08	21.96	23.72	22.82	23.01	24.14	27.37	31.66
14	340.23	391.42	381.68	198.53	102.76	139.16	162.63	167.93	138.83
15	46.27	64.04	64.39	77.49	55.14	53.44	59.62	70.03	85.75
16	1307.14	2265.57	1774.32	1919.10	1040.21	590.72	687.24	1468.70	2709.75
17	738.61	747.14	518.90	592.35	525.45	336.07	205.08	282.27	350.45
18	105.94	104.17	118.27	119.59	113.97	99.87	86.36	84.50	118.43
19	475.10	522.95	647.32	695.70	748.41	706.82	726.03	743.72	824.41
20	2370.42	1829.91	2237.33	2044.10	2120.58	1913.80	2339.80	2478.74	2864.43
21	147.55	149.52	153.65	141.23	132.15	116.57	117.27	103.37	114.19
22	165.16	121.47	133.61	111.29	107.82	110.37	116.47	112.38	150.08
23	3.70	5.95	9.93	12.80	12.17	9.91	9.73	11.89	16.52
24	189.27	167.45	172.83	178.78	190.20	170.80	170.37	178.74	165.95

Source: Own calculations based on the TSI dataset

According to Yercan and Isikli (2009), Türkiye is a prominent player in the global market for several horticultural products. Fruits and vegetables account for a large percentage of Turkish agricultural exports. Furthermore, due to the country's high demand for grain, grain imports were found to be significantly higher than exports. Imports continue to outnumber exports in the coffee, tea, and spice industries. The trade balance continues to improve in favor of exports when compared to imports of sugar and sugar products.

In the trade of pastry products such as cereals, flour, starch, or milk preparations, the share of exports in trade volume has risen over time. From 2002 to 2015, according to Bashimov (2017), Türkiye was a net exporter in the HS03, HS07, HS08, HS11, HS14, HS16, HS17, HS19, HS20, HS22, and HS24 coded product groups and a net importer in the HS12, HS13, HS15, and HS23 coded product groups.

The fruit business accounts for the majority of Türkiye's agri-food exports to EU countries. Though there have been some changes in exports throughout the years, fruit and vegetable exports continue to be a significant source of revenue for Türkiye's agricultural sector (Table 6b). Moreover, despite the 2014-2015 slowdown and low imports, the export-to-import ratio was regarded as high. In the export of meat and fish, a similar structure was seen. The amount of seafood exported has increased. The opposite tendency may be seen in the export of other animal products, where imports are becoming more common.

Table 6b. Export-import ratios of Türkiye in the period of 2010-2018 (EU)

HS	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*
01	1.84	0.34	0.32	1.50	1.77	0.67	0.53	0.21	0.17
02	0.92	0.54	2.74	10.58	341.67	6.09	902.26	2.18	1.20
03	1370.34	1663.35	1865.60	2066.94	2290.75	2701.10	2723.16	1635.40	2067.53
04	8.20	8.94	5.26	8.73	11.67	10.43	13.39	25.01	28.25
05	413.17	399.46	346.52	456.71	481.39	354.60	281.04	193.77	131.85
06	70.16	56.42	61.67	45.83	51.67	54.79	56.58	62.57	101.42
07	1531.24	1051.57	1044.90	1565.41	1189.43	730.53	1084.52	1442.07	1756.52
08	8822.88	7376.96	7854.64	7979.10	7598.98	5278.11	6909.81	7503.07	5905.15
09	270.65	204.24	205.62	217.79	208.44	190.42	232.06	172.56	141.96
10	32.70	6.57	14.97	25.33	17.76	11.46	11.27	5.29	10.26
11	93.67	77.70	66.84	51.46	50.28	54.34	42.00	26.05	21.02
12	22.44	22.76	37.43	20.56	20.06	24.35	30.52	59.58	52.37
13	5.97	12.90	10.40	12.18	15.97	20.54	24.18	28.68	27.30
14	5540.51	11576.66	4268.54	3233.88	710.22	595.51	1370.93	1673.50	1768.17
15	121.02	64.26	94.86	231.98	21.87	26.94	47.50	120.78	139.33
16	959.71	1611.76	1472.38	2015.43	1485.29	1395.28	2105.16	1752.23	2603.62
17	471.12	406.62	430.27	414.76	490.18	344.39	141.96	211.68	203.24
18	28.47	28.47	25.21	23.14	25.84	34.82	24.70	25.56	28.57
19	75.28	67.58	70.27	69.52	77.17	71.92	82.01	82.99	89.28
20	2976.19	2107.97	2738.02	2408.88	2478.22	1935.15	2418.28	2498.24	2719.65
21	69.62	78.66	73.86	62.62	57.59	41.82	42.46	39.66	42.73
22	111.90	69.61	69.65	46.21	44.42	45.10	51.65	47.14	85.81
23	3.60	0.87	0.64	1.13	4.02	2.95	2.45	3.61	4.56
24	169.89	120.86	88.68	79.12	104.38	80.10	64.59	95.63	90.24

Source: Own calculations based on the TSI dataset

Although sugar and sugar products are exported more than they are imported, this scenario tends to shift over time. Domestic output of animal-derived items, such as dairy products, eggs, and honey, failed to fulfill domestic demand, as evidenced by imports outnumbering exports. The biggest import values were for live animals and meat products, which were also the top export values. Türkiye has been importing meat for a long time. Although grain imports are in a similar scenario, it has been observed that this commodity is insufficient to meet the need for production abroad. However, various grains, flour, starch, and milk preparations have become increasingly significant in recent years.

The export-import ratios of agricultural food items exchanged with SCO countries may differ from those of agricultural food products traded with the rest of the world or EU countries (Table 6c). For example, Türkiye's meat trade with SCO countries, has remained strong and export-oriented. Other animal-derived goods have a far lower rate. The trade balance of cocoa and cocoa products has primarily been on the export side in recent years, while the import of this product has increased. Similarly, with the recent growth in imports of dairy products, eggs, and honey products, exports have become a major part of the trade volume of agri-food items. Cereal commerce, like that of the rest of the world and the EU countries, was dominated by imports. Türkiye has also purchased coffee, tea, and spices from SCO nations. Imports of edible oil products were found to be higher than exports of milling items such as malt, starch, and wheat gluten, lacquer, chewing gum, resin, and other vegetable saps and extracts, as well as animal and vegetable fats and oils. The export-import values for fish and other aquaculture products, which were initially close to each other, have increased on the export side over time, which is why the ratio of these product items has reached such high levels. Though the export-import balance has altered several times throughout the years, this ratio did not reflect a similar tendency for sugar and sugar products.

Table 6c- Türkiye's export-import ratios from 2010 to 2018 (SCO)

HS	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*
01	62.22	166.40	27.57	1.00	10.59	1.86	1.15	51.49	218.56
02	*	*	*	43714.90	*	92030.53	*	*	86928.89
03	75.69	121.75	107.10	230.90	321.29	260.23	336.27	279.80	368.46
04	1849.84	12387.70	3020.09	4003.55	2989.60	4273.09	7838.50	12796.67	1652.22
05	0.03	0.17	0.10	0.05	0.59	0.59	3.33	1.59	1.39
06	259.20	323.35	212.75	275.37	494.56	435.76	1128.09	513.63	829.48
07	557.30	413.18	430.94	327.91	344.99	361.41	53.78	44.99	88.34
08	2818.83	2418.01	1342.24	1592.78	1920.80	1150.60	427.53	531.27	1304.47
09	47.76	73.71	33.85	24.26	32.90	26.80	26.01	10.85	19.27
10	0.66	0.49	0.32	0.51	0.29	0.73	1.12	0.83	0.51
11	96.05	67.60	8.38	31.15	4.39	21.20	51.39	78.69	18.13
12	101.86	74.48	31.14	75.23	38.36	31.20	39.19	8.94	57.92
13	10.85	3.93	16.16	11.46	17.32	15.62	7.96	16.14	26.97
14	317.53	226.48	381.62	177.23	93.67	194.87	160.34	119.72	104.36
15	33.40	39.82	7.34	11.88	6.50	6.50	8.56	15.37	22.80
16	942.72	3328.62	1450.62	475.29	88.48	31.86	147.35	50.21	41.65
17	294.42	305.91	121.65	153.20	74.10	105.14	69.49	98.27	110.86
18	5436.82	4407.84	1601.24	1191.26	4426.85	19205.09	7326.58	248.96	423.44
19	2812.45	2815.36	2188.37	1359.38	1536.17	1473.66	2587.07	2122.90	1716.79
20	745.74	800.72	943.32	748.80	853.86	680.57	1172.40	1583.37	1983.36
21	540.41	477.91	277.06	159.20	138.49	96.85	91.91	78.35	83.07
22	13.99	6.43	6.30	3.98	7.60	19.74	33.06	25.62	20.41
23	0.89	0.54	0.81	0.56	0.67	0.54	0.75	1.06	1.37
24	115.48	188.49	302.22	310.08	308.58	199.01	219.59	136.67	143.68

*Import was not carried out. Source: Own calculations based on the TSI dataset

3.2. Comparative advantage in relation to the EU and the SCO

In its fruit trade with both the EU and the SCO, Türkiye has a comparative advantage (Table 7). However, while Türkiye had a comparative advantage in some of the agri-food items traded with these organizations, a variety of agri-food products were traded with EU countries. There was a comparative advantage in fruit, vegetables, fish, aquaculture, sugar, and sugar products. Ekmen Ozcelik & Erlat (2014) found that Türkiye has a higher index of revealed comparative advantage in fruit and vegetable products. Moreover, when we consider products such as fruit and vegetables, sugar and honey, and raw material for sugar between 1996 and 2007, Turkey has a higher comparative advantage than the EU in the group of milk powder. When the average LFI value from 2010 to 2018 is used, comparative advantage can be seen in fruit (0.17), vegetables (0.09), fish and seafood (0.03), and sugar and sugar products (0.02). For the study period, Türkiye's exports of certain products to EU countries have been greater than its purchases. On the other hand, live animals, cereals, coffee, tea extracts, yeasts, sauces, dietary foods, food industry residues, roughages, oilseeds, chocolate, and meat products have no comparative advantage.

Table 7- Comparison of Türkiye's competitiveness against the EU and SCO in the period of 2010-2018 (the Lafay index)

HS	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*Average*
European Union										
08	0.1695	0.1917	0.1878	0.1736	0.1715	0.1767	0.1739	0.1678	0.1631	0.1751
20	0.0844	0.1007	0.1023	0.0934	0.0948	0.1083	0.0975	0.1002	0.0940	0.0973
03	0.0175	0.0258	0.0257	0.0287	0.0294	0.0322	0.0424	0.0435	0.0446	0.0322
07	0.0338	0.0288	0.0221	0.0233	0.0202	0.0166	0.0247	0.0316	0.0336	0.0261
17	0.0066	0.0087	0.0087	0.0080	0.0080	0.0048	-0.0034	0.0034	0.0027	0.0053
16	0.0019	0.0024	0.0023	0.0032	0.0025	0.0022	0.0024	0.0024	0.0025	0.0024
05	0.0013	0.0024	0.0025	0.0030	0.0028	0.0016	0.0012	0.0007	-0.0006	0.0017
14	0.0007	0.0018	0.0009	0.0007	0.0003	0.0003	0.0005	0.0008	0.0005	0.0007
09	0.0006	0.0009	0.0007	0.0007	0.0000	-0.0001	0.0012	0.0005	-0.0006	0.0004
13	-0.0037	-0.0029	-0.0035	-0.0039	-0.0039	-0.0032	-0.0034	-0.0027	-0.0032	-0.0034
15	-0.0035	-0.0040	-0.0024	0.0024	-0.0144	-0.0107	-0.0099	-0.0030	-0.0013	-0.0052
06	-0.0063	-0.0058	-0.0066	-0.0110	-0.0102	-0.0082	-0.0090	-0.0065	-0.0028	-0.0074
11	-0.0048	-0.0034	-0.0047	-0.0074	-0.0079	-0.0076	-0.0095	-0.0094	-0.0116	-0.0074
04	-0.0092	-0.0040	-0.0079	-0.0103	-0.0120	-0.0105	-0.0089	-0.0060	-0.0069	-0.0084
24	-0.0059	-0.0041	-0.0137	-0.0175	-0.0157	-0.0156	-0.0208	-0.0095	-0.0125	-0.0128
22	-0.0066	-0.0097	-0.012	-0.0200	-0.0234	-0.0222	-0.0194	-0.0192	-0.0094	-0.0158
19	-0.0211	-0.0154	-0.0172	-0.0215	-0.0204	-0.0192	-0.0171	-0.0134	-0.0121	-0.0175
02	-0.0516	-0.0767	-0.0159	-0.0039	0.0001	-0.0054	0.0002	-0.0120	-0.0263	-0.0213
18	-0.0265	-0.0181	-0.0212	-0.0241	-0.0219	-0.0173	-0.0198	-0.0217	-0.0217	-0.0214
12	-0.0552	-0.0443	-0.0316	-0.0624	-0.0612	-0.0418	-0.0380	-0.0139	-0.0213	-0.0411
23	-0.0274	-0.0392	-0.0790	-0.0468	-0.0321	-0.0365	-0.0380	-0.0337	-0.0353	-0.0409
21	-0.0374	-0.0225	-0.0292	-0.0411	-0.0487	-0.0493	-0.0500	-0.0481	-0.0477	-0.0416
10	-0.0335	-0.0465	-0.0271	-0.0426	-0.0411	-0.0579	-0.0433	-0.0626	-0.0367	-0.0435
01	-0.0235	-0.0666	-0.0810	-0.0245	-0.0167	-0.0371	-0.0537	-0.0893	-0.0911	-0.0537
Shanghai Cooperation Organization										
08	0.2087	0.1938	0.1636	0.1694	0.1578	0.1789	0.1354	0.2093	0.1962	0.1792
07	0.0813	0.0675	0.0815	0.0769	0.0804	0.0798	0.0012	-0.0044	0.0111	0.0528
24	-0.0022	0.0081	0.0309	0.0327	0.0355	0.0335	0.0549	0.0183	0.0221	0.0260
18	0.0258	0.0269	0.0255	0.0239	0.0222	0.0207	0.0284	0.0171	0.0205	0.0234
20	0.0139	0.0111	0.0135	0.0145	0.0165	0.0145	0.0179	0.0260	0.0242	0.0169
21	0.0168	0.0179	0.0185	0.0107	0.0108	0.0063	0.0097	0.0049	0.0047	0.0111
03	-0.0025	0.0001	0.0029	0.0067	0.0119	0.0094	0.0138	0.0128	0.0198	0.0083
19	0.0073	0.0074	0.0078	0.0077	0.0084	0.0096	0.0148	0.0144	0.0119	0.0099
04	0.0025	0.0172	0.0022	0.0034	0.0032	0.0044	0.0147	0.0137	0.0124	0.0082
02	0.0060	0.0097	0.0161	0.0069	0.0094	0.0048	0.0026	0.0035	0.0026	0.0068
17	0.0074	0.0090	0.0090	0.0098	0.0043	0.0048	0.0036	0.0059	0.0062	0.0067
06	0.0007	0.0009	0.0007	0.0012	0.0019	0.0015	0.0052	0.0036	0.0045	0.0022
14	0.0029	0.0018	0.0042	0.0017	0.0006	0.0021	0.0023	0.0015	0.0007	0.0020
16	0.0005	0.0019	0.0005	0.0003	0.0002	-0.0002	0.0003	0.0000	-0.0001	0.0004
01	-0.0001	0.0000	0.0000	-0.0003	0.0000	-0.0001	-0.0001	0.0000	0.0001	-0.0001
13	-0.0031	-0.0029	-0.0010	-0.0017	-0.0007	-0.0011	-0.0013	-0.0012	-0.0008	-0.0015
09	-0.0018	-0.0006	-0.0007	-0.0017	-0.0004	-0.0011	-0.001	-0.0045	-0.0017	-0.0015
11	-0.0009	-0.0023	-0.0033	-0.0027	-0.0029	-0.0037	0.0001	0.0013	-0.0016	-0.0018
05	-0.0095	-0.0110	-0.0041	-0.0047	-0.0034	-0.0037	-0.0026	-0.0033	-0.0020	-0.0049
22	-0.0195	-0.0200	-0.0080	-0.0096	-0.0057	-0.0042	-0.0016	-0.0033	-0.0043	-0.0085
12	-0.0075	-0.0157	-0.0199	0.0030	-0.0080	-0.0137	-0.0074	-0.0475	0.0012	-0.0128
23	-0.0524	-0.0619	-0.0516	-0.0566	-0.0399	-0.0505	-0.0557	-0.0576	-0.0503	-0.0529
15	-0.0367	-0.0283	-0.0972	-0.0878	-0.1000	-0.1272	-0.1175	-0.0561	-0.0268	-0.0753
10	-0.2376	-0.2307	-0.1913	-0.2037	-0.2020	-0.1648	-0.1178	-0.1544	-0.2505	-0.1948

Source: Own calculations based on the TSI dataset

In comparison to EU countries, live animals (-0.05), cereals (-0.04), coffee and tea extracts (-0.04), yeasts and sauces (-0.04), food industry residues and roughages (-0.04), oilseeds (-0.04), cocoa (-0.02), and meat (-0.02) are at a disadvantage. The majority of these traded goods are targeted for import. According to the EU, while Türkiye received positive and rather high values in vegetables and fruits, it received negative and quite low values in grains, drinks, and cigarettes, according to the LFI estimated by Cagatay & Guzel (2003). Türkiye had a comparative advantage in its agricultural food trade with SCO countries. Fruit, vegetables, cocoa, coffee extracts, tea extracts, sauces, and yeast products are all examples. Fruits, vegetables, cocoa, and coffee extracts; tea extracts; yeasts; and sauces had comparative advantage index averages of 0.17, 0.05, 0.02, and 0.01 for fruits, vegetables, cocoa, and coffee extracts; tea extracts; yeasts; and sauces, respectively.

Türkiye has mainly exported these products to these countries. On the other hand, it cannot be said that it has a comparative advantage in cereals, animal and vegetable fats and oils, edible oils, food industry residues, roughages, oilseeds, soft drinks, alcoholic beverages, and vinegar products. Their indexes were, cereals (-0.19), animal and vegetable fats and oils, edible fats (-0.07), food industry residues and forages (-0.05), oilseeds (-0, 01), alcoholic beverages, and vinegar products (-0.01), in which the import side of the trade has played a more important role over the years. As the founder of the SCO, Russia has a comparative advantage in cereals and vegetable oils compared to Türkiye (Benesova et al. 2017; Liefert and Liefert 2020).

In trading with SCO countries, Türkiye has a comparative advantage in cocoa powder, chocolate, and other culinary products containing cocoa. In commerce with EU countries, Türkiye, on the other hand, has a comparative disadvantage in certain products when trading with EU countries. In recent years, exports of this food category have increased, particularly to China. In recent years, the export of this food category to China has increased significantly. The sauce and preparations were imported from China, in addition to the export and import of protein concentrate and protein-based compounds. SCO member nations export a lot of yeast and baking powder, which means they have a competitive edge. For the same products, however, there was a comparative disadvantage compared with the EU.

3.3. Analysis of the LFI with a duration greater than zero

The stability of the relative comparative trade advantage or trade competitiveness over time was tested using duration analysis. In Figure 1, the LFI index was used to show Türkiye's 9-year survival rate in the EU and SCO markets (groups). According to the survival analysis, since 2010, the EU and SCO countries' markets (groups) have been declining. The SCO countries saw the greatest drop in survival rates for the LFI >0 indicators. In other words, the EU and SCO markets' chances of survival plummeted from 92 percent in 2010 to 54 percent in 2018 for the EU and 30 percent for the SCO. Similar conclusions on the limited continuity of Türkiye's exports to EU member countries were found by Piskin (2017) in his study. The equality of survival functions in the LIF index for the EU and SCO groups was examined using two non-parametric tests (the Wilcoxon test and the log-rank test). The results demonstrate that at a 5% significance level, the equality of survival function between the EU and SCO groups may be rejected, indicating that there is no resemblance in the comparative advantage period between the two groups (Figure 1).

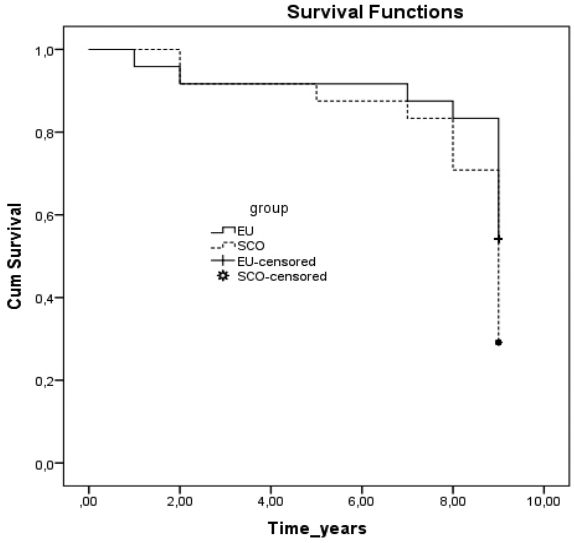


Figure 1- LFI Kaplan-Meier survival rates >0

4. Conclusions

Türkiye's overseas trade volume increased to $30 billion between 2010 and 2018. The volume of agri-food exports increased in both EU and SCO countries throughout this time. In 2010, the share of trade volume with SCO members was 37% of that with EU countries; by the end of 2018, it had risen to 52%. The reason for this was that trade volume with SCO countries increased at a faster rate than trade volume with EU countries.

Türkiye's agri-food exports increased from $12.040 billion in 2010 to $17.673 billion in 2018, while imports increased from $7.683 billion to $12.845 billion. Furthermore, the annual rates of export and import growth climbed by 5% and 7%, respectively. Türkiye's exports to EU nations grew at a slower rate than those to SCO nations. Similarly, agri-food imports from SCO countries increased at a quicker rate than imports from EU countries. In terms of import shares, the EU and SCO countries followed opposing trends. However, the import values of the SCO and EU countries were essentially the same towards the end of the study period.

Despite a foreign trade surplus in agricultural and food items with EU countries in 2018, the foreign trade balance slipped below $2 billion in 2018. Except for the first few years, the imports were higher in the adjustment of the agri-food trade balance with SCO countries. Despite these fluctuations over time, Türkiye's foreign trade balance for agri-food goods with both EU and SCO member nations continues to favor imports.

From 2010 to 2018, the vegetable and fruit trade was one of Türkiye's largest revenue generators in the agricultural food goods sector. Fruit and vegetable commerce had a higher export-import ratio than live animals and animal feed trade in Türkiye's trade with the EU and SCO countries. In other words, in the export of fruit and vegetable goods to these two nations, Türkiye possessed a comparative advantage.

Grain, food industry residues, roughages, and oilseed products, on the other hand, share a comparative disadvantage with these two groups. In addition, Türkiye had a comparative advantage and a comparative disadvantage in the SCO and EU countries, respectively, for the same cocoa products. Coffee extracts, tea extracts, yeasts, sauces, and dietary meals are all examples of this. The survivability analysis of its export competitiveness was conducted in the EU and SCO markets. Since 2010, survival rates for the LFI >0 index have been declining in the EU and SCO groupings. In other words, by 2018, the EU's and SCO countries' odds of survival, which were 92 percent in 2010, had dropped to 54 percent for the EU and 30 percent for the SCO countries. Between EU and SCO country groups, there is a variation in the comparative advantage period. During this time, it was discovered that the comparative advantage was not lasting. Policymakers should create supportive policies in this situation for sustainable exports with the EU and SCO.

Türkiye had a comparative advantage in the export of agri-food products to the EU and SCO markets for 8 and 13 food types, respectively. Exports were limited, however, due to preferential agri-food product trade adopted in the EU market for different political reasons. In contrast to the EU countries, there was a growth in foreign trade volume despite the lack of a stable foreign trade balance with the SCO countries. Given the limited supply of agricultural food items in the EU market, Türkiye could increase its export trade volume by strengthening ties with SCO nations. According to the findings, a large part of Türkiye's export of agricultural food products is to EU countries, but a significant part of its imports are from SCO countries. In this case, it seems to Türkiye's detriment that Türkiye prefers the EU to the SCO, or the SCO to the EU. It will be in Türkiye's favor if it maintains its relations with both institutions independently of each other. Finally, political structural reforms in the agri-food sector should be adopted to combat unfavorable trends in agri-food trade with EU and SCO members. In this context, having an effective institutional structure, implementing technology-oriented transformation, increasing the level of competence by creating a qualified workforce, and providing the necessary infrastructure support are the prerequisites for the increase in productivity required to compete in the international arena. Türkiye must transition from a technology-importing to a technology-producing country, it is necessary to focus on innovation activities and provide incentives to support innovation in a careful and planned manner. A sustainable competitive advantage requires the development of an innovation culture at the level of entrepreneurs, companies, industries, regions, and nations.

Data availability: Data are available on request due to privacy or other restrictions.

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