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Comparative Advantage of Yarn and Weaving Industries: Evidence for Türkiye and Top Exporters

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Abstract
With the repeal of the MFA agreement, the competitive conditions in yarn and weaving industries have changed. Especially, with the cheap labour of Asian and Far Eastern countries, they have become advantageous in this unrestricted competition environment. Therefore, this study was conducted to help to identify those products where Türkiye and her competitors have comparative advantages. This study mainly focuses on analysing the complementarity and substitutability of selected countries such as Türkiye, India, China and the USA. RTA, RC, RSCA and trade specialisation (TSI) indices were used to evaluate the competitive advantage. The results showed that Türkiye's competitiveness in cotton yarn and cotton weaving has deteriorated. However, India and China, which are the major countries in the world's cotton production, have a positive impact on their long-term competitiveness. Moreover, for these countries there is convergence in cotton yarn and divergence in cotton fabric products.

Keywords
comparative advantage, convergence, market share, product mapping, rank correlation.

1. Introduction

Today, due to modern technology, different parts of the world can communicate and trade easily with each other. With the globalisation of trade, access to markets and products all around the world has become easier. Transportation of products from one part of the world to another is today relatively easy and quick. Due to cheap labour in developing countries, many companies place their production in far off locations [1]. Although opinions differ regarding how globalisation is affecting developing countries, it seems to have helped many developing economies to flourish. It contributes positively to the economies of developing countries, especially due to the possibility to export local products to other countries and regions, and thus they become competitive on the global market.

The competitiveness of a country in the international markets depends on the competitiveness of the firm, industry and country. Competitiveness is narrowly addressed at the firm level and broadly at the country level. At the country level, international competitiveness is defined as the ability of an economy to create employment and a sustainable, high standard of living for the country's population [2]. Therefore, international competitiveness can be defined as the ability to sell goods abroad and maintain a foreign trade balance. Additionally, it is the ability to increase a country's income and employment level, to provide acceptable and continuous increases in the quality of life, and to increase its share in international markets [3]. According to Porter [4], the primary determinant of international competitiveness is the competitive power of companies. This depends on the ability of companies to produce with high quality and low cost [4]. Therefore, to increase the competitiveness of companies, they must produce efficient, cost-effective and high-quality products. Companies also gain competitiveness via innovations, R&D, labour productivity and new technologies. Innovations and R&D allow companies to achieve a significant position in the international markets [5, 6]. High rates of productivity growth are often regarded as a way of strengthening competitiveness [7]. New processes and the adaptability of new technologies to meet changing demands are also helping companies to achieve competitiveness [8]. Information technologies also create added value in the supply chain to enhance industrial competitiveness as it enables fast communication with suppliers and clients [9]. All these factors have a direct influence on company performance in terms of turnover increase or efficiency improvements. The strategies determined by companies primarily affect their performances in the market as well as their industry.

In the globalising world, the trade structure is changing rapidly and evolving towards capital-intensive production. Using capital-intensive technology has important economic consequences. The most important of these results is the gradual decline in the profitability of productions that do not involve technological innovation. The way to overcome this is to reduce the cost of either labour or capital. As a result, wages do not rise in the relevant market or the same amount is produced with more machines. The textile industry is the most remarkable example of such markets.

The textile industry is one of the oldest, largest and most global industries in the world. It is the typical 'starter' industry for countries engaged in export-orientated industrialisation and is labour-intensive [10]. It also plays a major role in the development and industrialisation process of countries. In many developed countries (the UK, European countries, the USA, Japan)

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this industry was the 'starter' industry in their industrialisation process. For newly industrialised economies, it was also their initial export industry. Since the 1980s, many developing countries in Asia and Africa have also become important textile exporters in the world market [11]. Türkiye has gone through a similar process of industrialisation. The textile industry has played a jump-starter role in the country's economy since the 1930s and shown important developments. Today, the sector, which comprises large and many small companies, plays an effective role in ensuring the socioeconomic balance of the country by creating high employment. Türkiye is the fifth largest textile exporter, with a 3.6% share of world exports in 2019, and the seventh largest apparel exporter, with a 3.3% share of world exports. As of 2019, textile exports had reached 12.4 billion dollars. The share of fibre exports in total textile exports is 7.7%, that of yarn exports - 20.8%, and the share of woven fabric exports - 33.8% [12]. Türkiye's most important competitors in these products are China and India. China has a substantial share of 69% and India a 9% share in cotton fabric exports.

The characteristics of the industry (relatively low capital intensity; low investment costs; and use of low skilled labour) also mean that the industry is relatively loose and able to adjust to changing market conditions quickly. Trade policy regulations have had a major impact on the pattern of textile production. With the repeal of the MFA in 2005, which had been in effect since 1974, new opportunities have emerged for many countries to penetrate into markets that were off-limits under the previous regime. It also poses threats of market losses in the face of competition from other countries [13]. This has intensified competition for traditional textile producers, especially in small and remote countries. The position of countries (like Türkiye) that are cost-ineffective, unable to create a national brand or adjust mark-up pricing, is gradually deteriorating in the international textile markets. In addition, in terms of inputs, the sector is heavily dependent on imports. All these developments in international trade bring great challenges for Türkiye because it has at least 50% untapped export potential in textile fabrics and products [14]. Therefore, the textile sector should be regulated according to the conditions of the global system. To achieve this objective, determination of the competitive advantage of Türkiye will help develop efficient policies. Therefore, the aim of the study is to measure and evaluate the relative level of competitiveness of the Turkish cotton weaving industry.

There are many studies investigating the competitiveness of the Turkish textile industry for different periods. Unlike those studies, our study will contribute to the literature in two ways. The primary focus of the analysis will be on that portion of the industry which initially transforms raw cotton into cotton yarn and cotton fabric. This paper accomplishes this analysis by comparing the competitive advantage of Türkiye relative to other countries producing cotton yarns and woven fabric using several measures (RTA, RC, RSCA, TSI). These are used to question Türkiye's position in the global market after the MFA repeal. We also analyse changes in export specialisation between the two periods: pre MFA repeal (2000-2004) and post MFA repeal (2017-2021)). For this, we apply Dalum et al's [15] approach. Here, the pattern of specialisation over time is evaluated using the Galtonian regression for each item.

We organised the rest of this paper as follows. Section 2 summarises the method and data. We discuss results in Section 3. The last section provides the concluding remarks.

2. Literature Review

The different approaches and perspectives of researchers about competitiveness cause the concept to be a controversial in the literature. Competitiveness has been defined from two perspectives: Micro (business and industry) and Macro (country). From a macro point of view, competitiveness emerges from classical trade theories (absolute advantage and comparative advantage). In addition to the factors specified by the classical trade theories, labour productivity, the capital output ratio, as well as differences in human capital, real wages of the labour force and R&D expenditures were also included in the analysis. These factors are stated as factors that increase the competitiveness of countries.

In studies that see competitiveness as an extension of the theory of comparative advantages, it is mentioned that competitiveness can be achieved by gaining superiority in the absolute price of goods and services offered to international markets. Although there is a consensus on the importance of price in determining competitiveness, there are differences in the measurement of price competition. After the approaches based on price competition, approaches examining competitiveness in terms of foreign trade have emerged. In these, competitiveness is associated with the country's export and import performance, export-import ratio, and foreign trade balance.

Many methods have been developed to measure the competitive advantage of countries. These are based on market share, which is a measure of the performance of a particular product in a particular market. Balassa [16] developed an index called "Revealed Comparative Advantage (RCA)" to make the phenomenon of comparative advantage simple and authentic. Since this index often gives consistent results, it is still used extensively. This index compares the relative share of a country's exports in a particular commodity to world exports and analyses the changes. The Balassa Index has been criticised for considering only exports and the symmetry problem. Therefore, the index was revised by Vollrath [17] taking into account import values. After Balassa, it has become the index most used in the literature. More recently, [18, 19, 20, 21, 22] undertook studies to analyse sector-specific and country-specific competitiveness using the RCA approach. Although Vollrath [17] solved the problem of symmetry by taking the logarithm of the RCA, he did not solve the problem of RCA

being undefined; because when a country's export in a particular product is zero, the RCA index is undefined. Therefore, Laursen [23] constructed a symmetric version of RCA, which he calls the revealed symmetric competitive advantage (RSCA), to overcome this problem.

These indices are frequently used in studies for the textile sector [24, 25, 26, 27], where global competition is increasing. It was used to examine the competition of the textile sectors in China [28, 29], India [28, 30, 31], Pakistan [32] and the USA [20, 29], which are important players. According to the results of these studies, China, Bangladesh, Vietnam, India and Türkiye are competitive countries in the textile sector. In the recent decades, the USA has been losing its competitiveness in this sector.

There are also many studies in the literature on the international competition of Türkiye's textile sector [29, 33, 34, 35]. These measured the international competition of products under HS 63. Although they consider different periods, the common result of these studies is that Türkiye's competitiveness is decreasing. This study differs from the existing ones in terms of analysing the international competition of cotton yarn and cotton weaving industries, which are part of the textile value chain. Limited studies are available on the international competition of these products [36, 37]. According to the results of these studies, although Türkiye has a comparative advantage, it is losing this due to the increasing share of Asian countries in exports.

3. Methodology

Within the study, cotton yarn (HS 5205, 5206, 5207) and cotton weaving (HS 5208, 5209), which are part of the textile value chain, are discussed. These products have high shares in Turkish exports. Türkiye's competitors in the above products were determined by taking the average of the export value for the 2013-2017 period. Türkiye's competitors in these products are the countries that have the highest share in the exports of these products. These countries are India, China and the USA, respectively. The data required to calculate the comparative advantage were obtained from UN COMTRADE for the 2000-2021 period. We calculated comparative advantage indices for each product and each country using these data. RXA, RMA, RTA, RC and RSCA indices were calculated to show the competitive status of the countries. Vollrath's indices can be calculated as follows:

$$RXA_{ij} = (X_{ij} / X_{it}) / (X_{nj} / X_{nt}) \quad (1)$$

$$RMA_{ij} = (M_{ij} / M_{it}) / (M_{nj} / M_{nt}) \quad (2)$$

$$RTA_{ij} = RXA_{ij} - RMA_{ij} \quad (3)$$

$$RC_{ij} = \ln(RXA_{ij}) - \ln(RMA_{ij}) \quad (4)$$

Here: X_{ij}: exports of commodity j, by country i, X_{it}: total exports excluding commodity j, by country i, X_{nj}: world exports of commodity j, excluding country i, X_{nt}: world total exports excluding commodity j and country i, M_{ij}: imports of commodity j, by country i, M_{it}: total imports excluding commodity j, by country i, M_{nj}: world imports of commodity j excluding country i, M_{nt}: world total imports excluding commodity j and country i.

RSCA indices can be calculated as follow:

$$RSCA_{ij} = \frac{(RCA_{ij}-1)}{(RCA_{ij}+1)} \quad (5)$$

Lastly, the trade specialization index is calculated:

$$TSI_{ij} = (X_{ij} - M_{ij}) / (X_{ij} + M_{ij}) \quad (6)$$

The value of this index ranges from −1, showing competitive disadvantage, to +1, showing that the product has a prominent competitive advantage. After calculating these indices, we calculated the Spearman rank correlation (SRC) coefficient to analyse the changes over the period 2000-2021 for Türkiye, India, China and the USA. The estimates range from -1 to +1. A low correlation coefficient means the ranking has changed to a great extent, indicating rapid structural change, while a high correlation coefficient means the ranking of the country's products on the basis of comparative advantage has not changed much over the selected time period [38].

Lastly, we constructed a product map using the RSCA and TSI. The product map comprises four groups: A, B, C, and D [39] (Figure 1):

Thus, leading exported products that have a high comparative advantage in the international market were identified. A specific exported product becomes a leading export if its share in the total world export is dominant [32].

In order to examine structural changes in trade specialisation patterns within the same sector across countries, we employ the Galtonian regression model [15, 40, 41, 42]. Thus, we question whether countries tend to converge within the same sector.

$$RSCA_{ij}^{t2} = \alpha_J + \beta_J RSCA_{ij}^{t1} + \varepsilon_{ij} \quad (8)$$

The superscripts t_1 and t_2 refer to 2000-2004 and 2017-2021, respectively. The dependent variable, RSCA at time t_2 for sector i, is tested against the independent variable, which is the value of the RSCA in t_1 . α and β are standard linear regression parameters and ε is a residual term. If β=1, which corresponds to an unchanged pattern from t_1 to t_2. If β>1, the countries which are specialised in the sector in question tend to become increasingly specialised in this sector, while countries that are under-specialised in the sector in question tend to become even less specialised in this sector. This is called **β-divergence**. If $0 < \beta < 1$ the existing specialisation pattern changes, i.e. on average countries with low initial RSCAs, increase over time, while for countries with high initial RSCAs, their values decrease. The situation in which $0 < \beta < 1$ can be termed **β -convergence**. If $\beta < 0$, it means that the ranking of countries has changed fundamentally. The regression effect is represented by (1–β). However, as pointed out by Dalum et al. [5], the evolution of the degree of

RSCA>0	**Group B** Comparative advantage Net importer (RSCA>0, TSI<0)	**Group A** Comparative Advantage Net exporter (RSCA > 0, TSI>0)
RSCA<0	**Group D** Comparative disadvantage Net importer (RSCA<0, TSI<0)	**Group C** Comparative disadvantage Net exporter (RSCA<0, TSI>0)
	TSI<0	**TSI>0**

Fig. 1. Product mapping

specialisation cannot be interpreted just from the β coefficients. The changes in the degree of specialisation can be analysed by using

$$\frac{\sigma_{t2}^2}{\sigma_{t1}^2} = \frac{\beta_j^2}{R_j^2} \quad (9)$$

where R is the correlation coefficient from the regression and σ the dependent variable's variance. β = R implies an unchanged pattern of a given distribution; β >R entails an increase in the overall degree of specialisation, and β<R indicates a fall. (1–R) measures the mobility effect. This allows analysis of the tendency towards polarisation of a country's trade specialisation pattern [15, 42].

This Galtonian regression is essentially analysed with simple OLS regression, in which the normally distributed error terms are assumed. However, this is not always the case with respect to RCA indices because these have non-normality and influential outliers. To overcome this problem, we apply quantile regression to the equation above (8). Koenker et al. [43] developed quantile regression analysis based on median regression to overcome the difficulty that occurs when the dependent variable is not normally distributed.

In our dataset, each RSCA index averaged over 2017-2021 is regressed on that over 2000-2004 for the USA, India, China and Türkiye. Export data can vary substantially from one year to the next, especially for small countries. Therefore, we took the averages of annual export data over 5 year periods. We conducted t-tests of whether the regression coefficient is significantly different from unity and the coefficient of determination, R, which would tell us whether the pattern of trade specialisation had strengthened.

4. Results and Discussion

In this section, the competitiveness of Türkiye against competing countries in cotton yarn and cotton weaving, which directly affect the textile sector, was analysed. The results revealed that in HS 5205 India had a comparative advantage in all three indices. Türkiye and India hold their comparative advantage (RSCA) in this product category. The USA has a comparative disadvantage compared to the competitors. According to RC, India is the most competitive, while the USA shows modest competitiveness (Table 1). Türkiye ranked second and China - third. These two countries also have low trade specialisation indices. India's specialisation in this product leads the comparative advantage (Table 2).

In HS 5206, Türkiye and India lead based on RSCA. According to RC, India and the USA have a comparative advantage. Here, China ranks third. Although China is the major exporting country, its RC and RTA values are low. The USA has no advantage over its competitors (Table 1). India has the highest trade specialisation index. The trade specialisation indices of the USA, Türkiye and China are also low (Table 2).

The country with the highest RTA index in HS 5207 is again India which, along with Türkiye, has a high relative export advantage in this product. China is ranked third. Its index increased substantially from 0.17 in 2000 to 0.85 in 2017, and it is becoming a rival. The USA has a disadvantage compared to its competitors. RC>1 for India, China and Türkiye which all have a comparative advantage. India has by far the largest comparative advantage; it averaged 5.05 throughout the period. China and Türkiye have indices that increased the comparative advantage substantially over the period. The USA has the lowest comparative advantage (Table 1) because of its negative trade specialisation indices (Table 2). In terms of RSCA, however, an uncommon situation arises. According to this index, while Türkiye has a very high advantage, India cannot sustain its advantage in RC. The USA and China have a disadvantage in this product.

China dominates the HS 5208 market with a market share of 57.96%. Its comparative advantage (RC) is ranked second on average. RC for Türkiye is positive but very low, showing low competitiveness. RC for the USA is negative, showing a comparative disadvantage. In terms of the RTA index, India and China have high RTA indices, showing a stable comparative advantage. All individual countries, except the USA, have a comparative advantage because their RSCA>1 (Table 1). The trade specialisation index for India and China is similar and positive, suggesting that these countries are exporters (Table 2).

In the HS 5209 market, China again dominates exports with a market share of 31.26%. RTA indices show that India, Türkiye and partially China maintained their trade competitiveness over the period. However, the USA remains a country with a comparative disadvantage. In terms of RC, only for India is RC> 1, showing a comparative advantage. Türkiye, China and the USA accounted for positive but low indices, suggesting comparative disadvantages. All these countries, except the USA, are to maintain their comparative advantage based on RSCA (Table 1).

Our results show that other countries, excluding the USA, are highly competitive in cotton yarn and weaving. Similarly, Şahinli [36] found that Türkiye has a comparative advantage in

HS Code	Year	RTA				RC				RSCA			
		US	IN	CN	TR	US	IN	CN	TR	US	IN	CN	TR
5205	2000	0.09	23.22	-1.17	7.99	0.30	5.34	-0.37	1.67	-0.47	0.92	0.44	0.82
	2010	0.92	15.30	-1.30	-0.87	2.28	5.01	-0.64	-0.25	0.01	0.88	0.19	0.50
	2021	0.72	16.70	-2.89	0.39	2.48	5.90	-2.12	0.08	-0.12	0.89	-0.43	0.66
	Mean	**0.75**	**15.37**	**-2.14**	**1.26**	**2.05**	**5.09**	**-1.03**	**0.32**	**-0.09**	**0.98**	**0.11**	**0.61**
5206	2000	-0.04	1.09	0.07	2.53	-0.08	5.11	0.03	1.53	-0.41	0.05	0.36	0.53
	2010	0.27	0.69	-0.10	2.39	1.02	2.69	-0.04	1.42	-0.41	-0.15	0.43	0.52
	2021	0.47	6.50	-0.01	3.79	1.96	4.09	-0.01	1.37	-0.30	0.74	0.15	0.67
	Mean	**0.41**	**1.68**	**-0.06**	**2.07**	**1.21**	**3.32**	**-0.02**	**1.10**	**-0.27**	**0.16**	**0.13**	**0.55**
5207	2000	-0.49	98.68	0.17	1.71	-1.55	5.86	1.17	2.11	-0.77	0.98	-0.60	3.89
	2010	-0.62	7.93	0.32	1.59	-1.29	4.80	2.10	1.65	-0.62	0.78	-0.47	3.94
	2021	-0.67	0.24	-0.01	8.75	-1.50	2.55	-0.02	2.81	-0.68	-0.58	-0.31	18.62
	Mean	**-0.30**	**29.15**	**0.31**	**3.88**	**-0.77**	**5.05**	**1.88**	**2.50**	**-0.44**	**0.35**	**-0.43**	**8.38**
5208	2000	-0.11	8.73	2.53	1.86	-0.31	4.04	0.72	0.89	-0.52	0.80	9.87	0.52
	2010	-0.16	2.67	4.36	-0.68	-1.08	1.84	2.47	-0.24	-0.85	0.52	9.52	0.43
	2021	-0.36	5.31	3.41	0.96	-1.64	2.74	3.27	0.55	-0.84	0.70	7.08	0.39
	Mean	**-0.17**	**4.27**	**3.57**	**0.50**	**-1.00**	**2.35**	**2.17**	**0.26**	**-0.75**	**0.62**	**8.72**	**0.44**
5209	2000	0.40	5.85	0.22	4.93	0.66	4.17	0.07	1.10	-0.09	0.71	0.50	0.76
	2010	0.43	1.91	1.59	4.55	1.04	1.93	0.91	0.82	-0.20	0.38	0.45	0.78
	2021	0.26	4.95	1.94	0.25	0.85	3.09	1.97	0.04	-0.38	0.68	0.39	0.75
	Mean	**0.42**	**3.37**	**1.39**	**2.86**	**0.96**	**2.27**	**0.93**	**0.58**	**-0.20**	**0.55**	**0.44**	**0.75**

Table 1. RTA, RC and RSCA Indices of Major Exporting Countries
Source: Authors' own calculation

HS Code	Year	US	IN	CN	TR
5205	2000	-0,16	0.99	-0.22	0.38
	2010	0,74	0.98	-0.62	-0,32
	2021	0,78	0.99	-0,71	-0,01
	Mean	**0,57**	**0.98**	**-0.36**	**-0.01**
5206	2000	-0.26	0,98	0.06	0.40
	2010	0,33	0.82	0.09	0.47
	2021	0,66	0.96	0.17	0.57
	Mean	**0,36**	**0.83**	**0.13**	**0.36**
5207	2000	-0.33	1,00	0.86	0.88
	2010	-0.65	0.98	0.83	0.58
	2021	-0.80	0.77	0.03	0.84
	Mean	**-0.40**	**0.93**	**0.75**	**0.81**
5208	2000	-0,35	0.96	0.40	0.12
	2010	-0.64	0.60	0.86	-0.34
	2021	-0.70	0.88	0.96	0.38
	Mean	**-0.57**	**0.75**	**0.78**	**-0.02**
5209	2000	0.12	0.96	0.10	0.22
	2010	0.28	0.62	0.47	0.15
	2021	0.19	0.88	0.81	-0.26
	Mean	**0.26**	**0.75**	**0.49**	**0.12**

Table 2. Trade Specialisation Indices of Major Exporting Countries
Source: Authors' own calculation

cotton yarn and weaving. Another study examining Türkiye's competitiveness in cotton yarn shows that it ranked sixth among 14 countries during 2000-2009 [37]. The most competitive countries in cotton weaving are Pakistan and India. The RC values of China, Türkiye and the USA are between 0 and 1. Again, in this study, India has a significant advantage in both cotton yarn and weaving. Unlike our study, the RC index of the USA for cotton yarn is higher than that of Türkiye. In Lyford et al. [44] stated that the USA was uncompetitive regarding cotton yarn for 1989-2001. They stated that with the repeal of the MFA in 2005, the USA's competitiveness would decrease, and textile trade would shift to countries with comparative advantages. Our study shows that Lyford et al.'s [44] prediction has been realised and that the situation in the USA has not changed since 2000.

The repeal of MFA has created an expansion of textile exports to developed markets for India. Even if the reforms in India lag behind the developments in China, they have increased their comparative advantage in these products with rapid economic growth. These advantages of China and India are also due to low production costs. According to the ITMF [45], production costs in cotton yarn are (2,110) in India, (2,120) in China, (2,270) in Türkiye and (2,650) in the USA. According to these figures, for Türkiye, the production cost is 7%-8% higher than in India and China. This rate increases to 25% for the USA. As a result, many international textile companies have shifted their production to these countries. This situation and the expensive labour puts Türkiye in a disadvantageous position.

We use the RSCA and TSI indices to map cotton products for Türkiye and India. Before MFA, Türkiye had a comparative

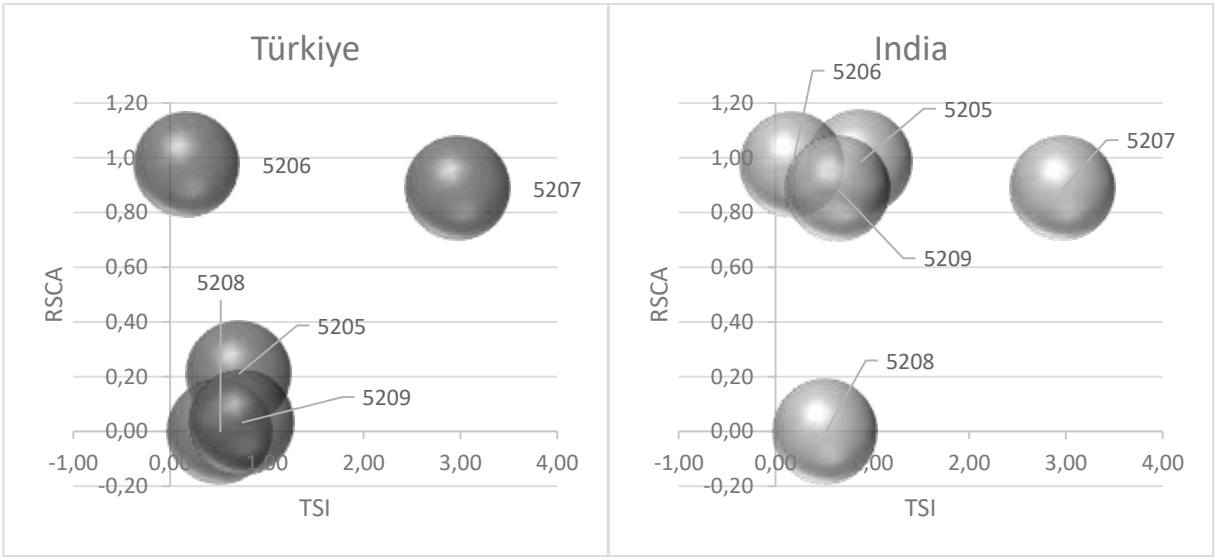


Fig. 2. Product mapping of Türkiye's and India's cotton yarn and cotton weaving industries (Pre MFA repeal)

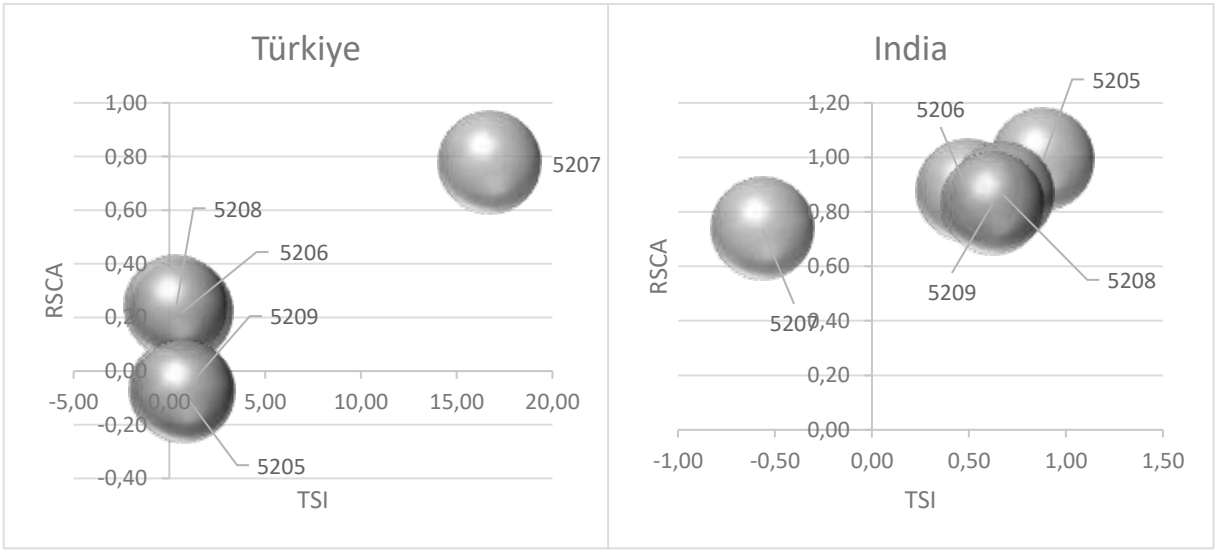


Fig. 3. Product mapping of Türkiye's and India's cotton yarn and cotton weaving industries (Post MFA repeal)

advantage, especially for HS 5207 and 5206 (Figure 2). Although Turkey has a low RSCA and TSI in HS 5205, 5208 and 5209, it has a comparative advantage. After MFA, Türkiye's competitiveness deteriorated. Türkiye remains globally competitive only in HS 5207. On the other hand, the repeal of the MFA had a positive effect on India, whose competitiveness regarding products other than 5207 has strengthened (Figure 3). The development in competitiveness is due to the increase in R&D investments in India. The industry's overall production technological status has deteriorated in the post-MFA regime and, therefore has substantial scope for improvement, possibly through more effectively using the prevailing technological upgradation funds scheme and other official arrangements [13].

Table 3 shows low rank correlation coefficients for the USA in the case of HS 5205, 5206 and HS 5207. These low rank correlation coefficients indicate a structural change during 2000-2021. High rank correlation coefficients for HS 5208 and HS 5209 indicate a little change in the rankings based on comparative advantage during the study period. For India, low rank correlation coefficients in the HS 5205, HS 5206, HS 5207 and HS 5209; reveal a high structural shift for yarn and weaving exports. China has high rank correlation coefficients in all product categories except HS 5208. Türkiye has low rank correlation coefficients for HS 5205 and HS 5209, indicating a structural change during 2000-2021.

Table 4 compares some descriptive statistics of the RSCA index for the periods 2000-2004 and 2017-2021 for each of the four sectors in the cotton weaving industry for Türkiye and its competitors. Only in HS 5207 is the sample mean of RSCA higher in the 2017-2021 period compared

HS Code	US	IN	CN	TR
5205	0,51**	0,21	-0,98*	-0,43**
5206	0,47**	0.37	-0,67*	0,82*
5207	0,31	-0,99*	0,74*	0,94*
5208	-0,87*	-0,12	-0,17	-0,86*
5209	-0,81*	-0,08	-0,79*	0,34

*Significant at * 1%, ** 5%*

Table 3. Spearman Rank Correlation Coefficient for Major Exporting Countries (2000-2021)
Source: Authors' own calculation

HS code	Period	Mean	Std Dev.	Min	Max	Median
5205	2000-2004	0.42	0.40	-0.41	0.88	0.58
	2017-2021	0.30	0.48	-0.44	0.89	0.29
5206	2000-2004	0.17	0.32	-0.45	0.48	0.41
	2017-2021	0.30	0.35	-0.30	0.74	0.34
5207	2000-2004	0.92	1.90	-0.67	5.31	0.91
	2017-2021	3.92	7.72	-0.68	19.31	-0.24
5208	2000-2004	2.23	3.52	-0.81	8.71	0.81
	2017-2021	2.05	3.62	-0.88	8.88	0.51
5209	2000-2004	0.40	0.33	-0.19	0.75	0.48
	2017-2021	0.30	0.48	-0.43	0.89	0.51

Table 4. Descriptive statistics for RSCA
Source: Authors' own calculation

HS code	$RSCA^{t1}_{ij} = RSCA^{t2}_{ij}$	R^2_{ij}	β_{ij}	$\lvert\beta_{ij}\rvert / \lvert R_{ij}\rvert$
5205	0.79	0.54	0.87*	1.39
5206	0.74	0.70	0.89*	1.13
5207	0.30	0.51	1.18*	2.74
5208	0.89	0.91	1.17*	1.51
5209	0.78	0.82	1.14*	1.59

*Significant at * 1%, ** 5%*

Table 5. Sector-wise export specialisation patterns between 2000-2004 and 2017-2021
Source: Authors' own calculation

to 2000-2004. Except for HS 5205, 5206 and 5209, the variances are also higher, suggesting a greater dispersion in export specialisation across countries. For HS 5207 and 5208 the differences between maximum and minimum values are greater, indicating that some countries have continued to dominate the export of these products. For other products other than HS 5208, the median does not deviate from the averages.

Galtonian regression is essentially a simple OLS regression where the normality is assumed on the error's terms. Thus, we first investigated whether or not the normality assumption is met. The normality of the residuals from the regression was tested using the Shapiro-Wilk test, which rejects the null hypothesis of normality. Therefore, we performed the quantile regression in the Galtonian regression model. According to the quantile regression results, there is β-convergence in HS 5205 and HS 5206. In other words, for cotton yarn products the existing specialisation pattern is changing. Countries with low initial RSCAs increase over time, while for countries with high initial RSCAs their values decrease. In HS 5207, HS 5208 and HS 5209, the existing specialisation pattern changes named as β-divergence. This means that the countries which are specialised in cotton fabric products tend to become increasingly specialised in this sector. While those that are under-specialised in these products tend to become even less specialised (Table 5).

Only the β_{ij} coefficient is not sufficient to evaluate the changes in the sectoral specialisation of the countries. When β_{ij} and $|\beta_{ij}|/|R_{ij}|$ are evaluated together, it is seen that $|\beta_{ij}|/|R_{ij}|$ is greater than one for all products. In other words, the export pattern of the countries diverges for all products. The regression effect (1–β) is found to be small for all the products, suggesting a sticky specialisation pattern. On the other hand, the mobility effect (1–β) is low for HS 5208 and HS 5209, indicating little change in the relative positions of the countries. In other products, the mobility effect is relatively higher. In these products, there are significant changes in the relative positions of the countries (Table 5).

As a result, competition regarding the products considered is gradually increasing and significant changes are seen in the ranking of the countries' export specialisation. There is no study in the literature that deals with the stability of specialisation only in the export of cotton woven products. In studies covering the manufacturing industry or different industrial products, it is stated that countries that specialise in the export of traditional or low-tech goods such as textiles and food products are economically behind other countries [33, 35]. As the USA and China became more and more specialised in the export of high-tech goods, we can say that their comparative advantage decreased in the period under consideration.

5. Conclusions

Türkiye is amongst the world's foremost cotton producers. A significant portion of the crop is used to produce cotton yarn and cotton weaving. Because of the strategic importance of this sector in the Turkish economy and the threat posed by competitors, it is becoming crucial to determine the profitable products for Türkiye. This study helped identify those products for which Türkiye and her competitors have comparative advantages. This study mainly focuses on analysing the complementarity and

substitutability of selected countries such as Türkiye, India, China and the USA.

Results show that over the last 17 years, Türkiye has had positive RSCA values, and among the four countries, it ranks first in HS 5206, HS 5207 and HS 5209, second in HS 5205, and third in HS 5208. However, when the RC values are considered, India's comparative advantage in all five products draws attention. India has a foregone strategic advantage in many value-added products which were earlier considered as being their stronghold to low-cost countries like Bangladesh and Vietnam (Kathuria, 2018). China is emerging as an important rival for Türkiye in three products (HS5207, HS 5208, HS 5209). The USA has lost a comparative advantage for all the products.

Finally, all the results indicate that India and China remain globally competitive, and Türkiye will have to compete with these two countries in the coming years in the global cotton yarn and weaving industry. Türkiye will even have to compete with Vietnam and Bangladesh, which have the advantage of low labour cost.

Türkiye draws much of its competitiveness from being one of the major cotton producing countries. There are some problems behind the country's inability to compete in cotton and cotton-based industries. High input cost in cotton production is one of the primary factors that negatively affect the competitiveness. Besides, the "average domestic market price" does not meet the cost due to the effect of subsidised imports. Although a significant support premium is given to cotton production in our country, the effectiveness of the support is decreasing because of high costs.

This high cost problem concerning the raw material of the textile industry causes other problems that are difficult to eliminate during the production stages of the textile industry. Therefore, the production cost is also increased in the textile industry. In terms of cotton weaving and clothing, significant cost increases have been observed recently, mainly due to raw material and energy costs, including labour. Especially, cheap labour has been an advantage in the past years. Recently, labour costs have increased and the competitive advantage has decreased. It is observed that Türkiye has gradually lost its advantage of low labour costs recently.

Limitations and Future Scope

The textile sector covers chapters 50 to 64 of the harmonised system. Our study, on the other hand, covers only some products in Chapter 52. Since these products were examined in HS 4-digits for the 2000-2020 period, it was difficult to give the results in tabular form. Examining the products from chapters 50-64 in HS 2-digits, or even as traditional and technical textile products, will reveal more clearly in which areas the Turkish textile industry will be competitive in the future. Thus, it will be revealed which sub-sectors should be prioritised in order to sustain its contribution to the economy.

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Declaration of Conflicting Interests

The Authors declare there is no conflict of interest.

References

1. Mottaleb, K.A. & Kalirajan, K.P. (2014), "Determinants of Labor-Intensive Exports by the Developing Countries: A Cross Country Analysis", The Singapore Economic Review, vol. 59, no. 5, pp. 1.
2. Commission of the European Communities (CEC). (2006). Economic reforms and competitiveness: Key measures from the European Competitiveness Report 2006. Communication from the Commission, COM(2006) 697 final, Brussels.
3. Kırankabeş, M. C. (2009). Global Competitiveness Analysis Method and Ability to Perceive Global Crises An Evaluation of Turkey in the Line of 2008-2009 World Economic Forum Global Competitiveness Report (In Turkish). *Mevzuat Dergisi* Vol 143, [Retrieved from http://www.mevzuatdergisi.com/2009/11a/02.htm].
4. Porter, M.E. (1990). New Global Strategies for Competitive Advantage. *Planning Review*, May/June, pp. 4-14.
5. Czajkowski, T. & Woźniak-Malczewska, M. (2017). Innovativeness of Chosen Polish Textile-Clothing Companies, AUTEX Research Journal, Vol. 17, No 1, March 2017, pp.48-52.
6. Pazilov G.A., Ivashchenko N.P., Bimendiyeva L.A., Aitymbetova A.N., (2020). Textile Industry: Issues of Managing the Growth of Innovative Activity in Enterprises, Polish Journal of Management Studies, Vol. 21 No.1, pp.297-315.
7. Dhiman, S., Sharma, M. (2019). Relation between Labour Productivity and Export Competitiveness of Indian Textile Industry: Co-integration and Causality Approach, Vision, 23(1), pp.22-30.
8. Arora, K. & Siddiqui, A.A. (2022). Exploring trade and technological linkages: evidence from India's sectoral GVC participation, Transnational Corporations Review, DOI: 10.1080/19186444.2022.2041350
9. Yuan, H., Jiang, X. (2021). Information technology integration and the competitiveness of textile industry in China, Industria Textila, Vol 72, No.4, pp.426-433.
10. Keane, J., te Velde D.W. (2008), The role of textile and clothing industries in growth and development strategies, Overseas Development Institute, [Retrieved from https://cdn.odi.org/media/documents/3361.pdf].
11. Alam, M.S., Selvanathan, E:A:, Selvanathan, S., Hossain, M. (2019). The apparel industry in the post-Multifiber

Arrangement environment: A review, Rev Dev Econ. 2019;23:454–474.
12. T.C. Ministry of Industry and Technology, (2020). Textile, Apparel and Leather Products Sectors Report, General Directorate of Industry, Sector-Based Reports and Analysis Series. Ankara (In Turkish).
13. Bhandari, A.K. (2021). Withdrawal of the multifibre agreement and Indian textile industry: Concerns, efforts, and achievements, Rev Dev Econ. 2021;25:1397–1436.
14. ITC, (2022). Export Potential Map [Retrieved from https://exportpotential.intracen.org/en/products/tree-map?fromMarker=i&exporter=156&toMarker=w&market=w&whatMarker=k].
15. Dalum B., Laursen K. & Villumsen, G (1998). Structural Change in OECD Export Specialisation Patterns: de-specialisation and 'stickiness', *International Review of Applied Economics*, 12(3), 423-443, DOI: 10.1080/02692179800000017.
16. Balassa, B. (1965). Trade liberalization and revealed comparative advantage. *The Manchester School,* 33(2), pp. 99–123.
17. Vollrath, T.L. (1991). A Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comperative Advantage. *Weltwirtschaftliches Archiv*, 127(2), pp. 265-280.
18. Jayawickrama, A., Thangevulu, S. M. (2010). Trade linkages between China, India and Singapore: Changing Comparative Advantage of Industrial Products. *Journal of Economic Studies* Vol. 37(3), p.130-147.
19. Cuc, S. & Tripa, S. (2018). The Evaluation of Balkan Countries Clothing Trade with EU-28 Based on The Analysis of Comparative Advantages Indices. *Tekstil ve Konfeksiyon,* 28(3), pp. 178-181.
20. Kim, M. (2019). Export Competitiveness of India's Textiles and Clothing Sector in the United States, *Economies*, 7, 47. Doi: 10.3390/economies7020047.
21. Gautam, S & Lal, M. (2020). Analysing competitiveness and trade performance: evidence from Indian textile industry and its select competitors. *Transnational Corporations Review*, 12:4, 406-424, DOI: 10.1080/19186444.2020.1768794.
22. Corovic E, Gligorijevic Z, Kostadinovic I. (2020). ;Export Competitiveness of Textile and Clothes of Western Balkan Countries. FIBRES & TEXTILES in Eastern Europe, 28, 4(142): 8-14. DOI: 10.5604/01.3001.0014.0927
23. Laursen, K. (2015). Revealed Comparative Advantage and the Alternatives as Measures of International Specialization. *Eurasian Business Review*, 5(1), 99-115. https://doi.org/10.1007/s40821-015-0017-1
24. Yilmaz ND. & Karaalp-Orhan HS. (2015). Comparative Advantage of Textiles and Clothing: Evidence for Top Exporters in Eastern Europe. *Fibres & Textiles in Eastern Europe,* 6(114): 8-13. DOI: 10.5604/12303666.1167411
25. Tripa, S., Oana, I. & Cuc, S. (2016). Revealed comparative advantage and competitiveness in Romanian Textile and Clothing Industry. *Industria Textila*, 67(5), p.338-344.
26. Saki, Z., Moore, M., Kandilov, I., Rothenberg, L. & Blanton Godfrey, A. (2019). Revealed comparative advantage for US textiles and apparel. *Competitiveness Review: An International Business Journal,* 29(4), pp. 462-478. DOI 10.1108/CR-03-2018-0025
27. Prasetyani, D., Abidin, A.Z., Purusa N.A., Sandra, F.A. (2020). The Prospects and The Competitiveness of Textile Commodities and Indonesian Textile Product in the Global Market, **Etikonomi,** Volume 19 (1), pp 1 – 18.
28. Xu, J., Liu, Y., Yang, L. (2018). A Comparative Study of the Role of China and India in Sustainable Textile Competition in the U.S. Market under Green Trade Barriers, Sustainability, 10, 1348; doi:10.3390/su10051348
29. Karabay, G., Sarıçaoban, K. (2021). Research on Competitiveness in Technical Textiles: Comparison of Countries Having the Lion's Share of Technical Textile World Exports and Turkey, FIBRES & TEXTILES in Eastern Europe 2021; 29, 6(150): 22-31. DOI: 10.5604/01.3001.0015.2718
30. Kathuria, L.M. (2018). Comparative advantages in clothing exports: India faces threat from competing nations. *Competitiveness Review: An International Business Journal*, 28(5), pp.518-540. DOI:10.1108/CR-01-2017-0010.
31. Kim, M. (2019). Export Competitiveness of India's Textiles and Clothing Sector in the United States, Economies, 7(47), pp1-17, doi:10.3390/economies7020047.
32. Akhuand, A. & Abbas, S. (2021): Modeling determinants of competitiveness: a case of textile sector of Pakistan. *The Journal of the Textile Institute*, Ahead-of-Print, 1-10 DOI: 10.1080/00405000.2021.2020415
33. Karaalp HS & Yilmaz ND. (2012). Assessment of Trends in the Comparative Advantage and Competitiveness of the Turkish Textile and Clothing Industry in the Enlarged EU Market. *Fibres & Textiles in Eastern Europe*, 20, 3(92): 8-11.
34. Sarıçoban, K., Kösekahyaoğlu, L. & Erkan, B. (2017). Determination of Turkey's Competitiveness Level in Exports of Textiles: An Analysis for the Period of 1996-2015. *Kesit Akademi Dergisi*, 8, pp. 186-203 (In Turkish).
35. Kanat, S. (2019). Analysis of the Competitiveness of the Turkish Textile and Clothing Sector in the European Union Market. *Fibres & Textiles in Eastern Europe*, 27, 2(134), pp. 9-18. doi: 10.5604/01.3001.0012.9981.
36. Şahinli, M.A. (2011). Revealed Comparative Advantage Index: An Application on Turkey Cotton Industry. SÜ İİBF Sosyal ve Ekonomik Araştırmalar Dergisi, 21, pp. 227- 240 (In Turkish).
37. Kılıç, A. (2013). Analysis of International Competitiveness of Turkish Cotton and Determining the Factors Affecting It (PhD Thesis in Turkish). Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/ . (Accession number: 307759).
38. Kathuria, L.M. (2013). Analyzing competitiveness of clothing export sector of India and Bangladesh. *Competitiveness Review: An International Business Journal*, 23(2), pp.131-157. DOI: 10.1108/10595421311305343.
39. Widodo, T. (2009). Comparative Advantage: Theory. Empirical Measures and Case Studies, s. 58-81. [Retrieved from https://www.researchgate.net/publication/227367489_Comparative_Advantage_Theory_Empirical_Measures_And_Case_Studies]
40. Lee, J. (2011). Export specialization and economic growth around the world. *Economic Systems*, 35, pp. 45–63. doi:10.1016/j.ecosys.2010.11.002.
41. Sanidas, E. & Shin, Y. (2011). Convergence towards the Revealed Comparative Advantage Neutral Point for East Asia: Similarities and Differences between the Three Countries. *Seoul Journal of Evonomics* 24(1), pp. 21-50.

42. Khurana, R. & Nauriyal, D.K. (2017). Dynamics of Services Exports in India. *Millennial Asia*, 8(2), pp. 178–193.
43. Koenker, R. & Bassett, G. (1978). Regression Quantiles, Econometrica, 46(1), pp. 33-50.
44. Lyford, CP. & Welch, JM., (2007). Measuring Competition for Textiles: Does the United States Make the Grade?. *International Food and Agribusiness Management Review*, 10 (4), p. 64-79.
45. ITMF. (2014). International Production Cost Comparison 2104. Zürich, Switzerland.