Akademik Hassasiyetler **The Academic Elegance**
Yıl/Year: 2020 **Sayı/Issue: 13**
Cilt/Volume: 7 **Sayfa/Page: 547-564**
Araştırma Makalesi
Makale Gönderim Tarihi: 06/02/2020 **Makale Kabul Tarihi: 29/05/2020**

DETERMINATION OF THE FACTORS AFFECTING COTTON EXPORT OF TURKEY: A PANEL GRAVITY MODEL APPROACH

Fatma Feyza GÜNDÜZ[*], Özlem AKAY[**], Selim GÜNDÜZ[***]
Celile DÖLEKOĞLU[****]

Abstract

Turkey has the ecological characteristics adequate to cotton farming and thus it plays an important role in production and trade worldwide. Determining the significant factors affecting the trade of cotton, which is an important product both for exports and imports and revealing whether these factors differentiate by national and global dynamics or not is considerably important. In this study, the factors affecting cotton export of Turkey between the years of 2002 and 2017 are analysed by using gravity model and panel data method. It is determined that Turkey's cotton export has a positive relationship with gross domestic product, gross domestic product per capita values, population and EU membership of the countries to which Turkey exports cotton and a negative relationship with Linder variable. On the other hand, the variable of border neighborhood does not have a statistically significant effect on Turkey's cotton export either since the share of these countries in total cotton exports is quite low compared to EU member countries. In conclusion, factors that may increase the competitive advantage in potential markets should be taken into consideration in terms of new market opportunities as the distance of trading countries does not have any effect. Particularly, policies of USA and China which are effective in world's market are important variables for Turkey as they are for other countries. Therefore, the policies of these countries should be carefully monitored when making any regulation.

Keywords: *Cotton, Export, Gravity Model, Panel Data*

TÜRKİYE'NİN PAMUK İHRACATINI ETKİLEYEN FAKTÖRLERİN BELİRLENMESİ: BİR PANEL ÇEKİM MODELİ YAKLAŞIMI

[*] Dr. Öğr. Üyesi, Adana Alparslan Türkeş Bilim ve Teknoloji Üniversitesi İşletme Fakültesi, Uluslararası Ticaret ve Finans Bölümü, ffgunduz@atu.edu.tr, https://orcid.org/0000-0001-7603-6817
[**] Arş. Gör. Dr., Çukurova Üniversitesi FEF İstatistik Bölümü, oakay@cu.edu.tr, https://orcid.org/0000-0002-9539-7252
[***] Dr. Öğr. Üyesi, Adana Alparslan Türkeş Bilim ve Teknoloji Üniversitesi İşletme Fakültesi, İşletme Bölümü, sgunduz@atu.edu.tr, https://orcid.org/0000-0001-5289-6089
[****] Prof. Dr., Adana Alparslan Türkeş Bilim ve Teknoloji Üniversitesi İşletme Fakültesi, İşletme Bölümü, codolekoglu@atu.edu.tr, https://orcid.org/0000-0003-4421-2956

Öz

Türkiye pamuk tarımına uygun ekolojik özelliklere sahip olduğundan dünya üretimi ve ticaretinde önemli bir yerdedir. Gerek ihracat gerekse de ithalatta önemli bir ürün olan pamuğun ticaretinde önemli olan etkenlerin belirlenmesi, ülkelere ve küresel dinamiklere göre bu etkenlerin farklılaşıp farklılaşmadığının ortaya konulması oldukça önemlidir. Bu çalışmada 2002-2017 yılları arasında Türkiye'nin pamuk ihracatını etkileyen faktörler çekim modeli kullanılarak panel veri yöntemiyle analiz edilmiştir. Türkiye'nin pamuk ihracatının, ihraç ettiği ülkelerin gayrisafi yurtiçi hasıla ve kişi başına düşen gayrisafi yurtiçi hasıla değerleri, nüfus ve AB üyesi olması değişkenleri ile pozitif, Linder değişkeni ile ise negatif yönde ilişkili olduğu belirlenmiştir. Ayrıca ülkelerin sınır komşuluğu değişkeninin, Türkiye'ye komşu ülkelerin toplam pamuk ihracatındaki payının AB ülkelerine kıyasla oldukça düşük olmasından dolayı, Türkiye'nin pamuk ihracatı üzerinde istatistiksel olarak anlamlı bir etkisinin olmadığı belirlenmiştir. Sonuç olarak, ticaret yapan ülkeler arasındaki mesafenin bir etkisi olmadığı için potansiyel pazarlarda rekabet avantajını artırabilecek faktörler yeni pazar fırsatları açısından dikkate alınmalıdır. Özellikle dünya pazarında etkili olan ABD ve Çin politikaları, diğer ülkeler için olduğu gibi Türkiye için de önemli değişkenlerdir. Bu nedenle, herhangi bir düzenleme yapılırken bu ülkelerin politikaları dikkatle izlenmelidir.

Anahtar Kelimeler: *Pamuk, İhracat, Çekim Modeli, Panel Veri*

Introduction

Today, when the whole world has been affected by globalization process, foreign expansion and being integrated with global markets are of great importance for national economies to grow. Commercial policy has a particularly active role in economic growth, for being one of the most important political instruments that the developing countries use in industrialization.

It is possible to see the effects of globalization process on the institutional and normative changes at an international level. Establishment of World Trade Organization (WTO) in 1994 to regulate international trade and establish a frame for trade policies has led to various agreements that require institutional reform including intellectual property agreements. Consequently, an increased communication was characterized between the countries by way of trade and direct foreign investment (Campi and Duenas, 2019: 531).

Being one of the fundamental commodities in the global economy, cotton is a renewable source of raw material that meets the vital needs of humans by being converted into textile products, garments and many other products in the form of natural fibers. Regarded as one of the oldest crops traded in the world, cotton maintains its importance today as it is a crop to produce fibers and oil (Küçük, 2015: 82). Cotton is of great importance for humanity due to its common and indispensable usage and for producer countries due to the added value it creates and the employment opportunities it provides. Growing population, heightening interest in natural fibers and

advancement of standard of living also increase the demand for cotton (Şahinli, 2011: 230).

As a global industry, cotton growing conditions and various aspects of cultivation vary significantly due to different environmental, archaeological, climatic, socio-economic and political conditions in the world. These changes in the circumstances mean that the same crop may be cultivated in significantly different ways with different impacts and there might be considerably different alternatives and abilities to address these impacts. Nevertheless, impacts of cotton growing are generally regarded as global in spite of rather different circumstances and structure of proper reactions specific to the field (FAO, 2015).

Besides the regulations related to foreign trade, predictability of global dynamics is important for related countries. Therefore, the data provided by the researchers are used as important data sources by decision makers in addition to the works of ministries and producer organizations in related countries. Particularly the studies on measuring the market potentials of the countries which are placed near the top in foreign trade (Afridi et al., 2016; Liu and Chen, 2018), studies that reveal the impact of the policies pursued in domestic and international trade on cotton production and trade (Theriault, 2011; Alem and Elias, 2018; MacDonald et al., 2012; MacDonald, 2010; Jales, 2010; Ridley and Devadoss, 2014; Bassett, 2008; Quark, 2012; Yanıkkaya and Koral, 2013) and researches measuring the competitive power of the countries in cotton production and trade (Çiçek and Bashimov, 2016; Bashimov, 2016; Bashimov, 2015; Hatab and Romstad, 2013; Şahinli, 2011; Kılıç, 2013) provide findings which serve as data for stakeholders. Studies on international cotton and textile trade where the panel gravity model is used (Lau and Bilgin, 2010; Lee et al. 2014; Kiani et al., 2018; Özer, 2014) also contribute to the industry and literature. Çelik and Kıral (2018, 2019) tried to determine the economic and demographic factors of the panel data affecting the house prices. Akay and Yüksel (2018) presented that the mixed panel dataset is clustered by agglomerative hierarchical algorithms based on Gower's distance and by k-prototypes. Akay and Yüksel (2018) suggested a new distance for clustering of the mixed variable panel data set containing invariant time binary variable, without performing variable conversion to avoid information loss.

The aim of this study is to reveal the determinants of Turkey's cotton exports as well as constituting an empirical example of the cotton trade. It can also be used as data for policy makers and a new source of information for other stakeholders as it reveals the effective factors and with its difference from the other studies where gravity model centered upon different products.

1. COTTON PRODUCTION AND TRADE IN THE WORLD AND IN TURKEY

Cotton provides approximately 35% of the fibers produced in the world and in this sense, it is one of the most important fibers used in textile industry. Cotton is cultivated in around 80 countries in the world but two-thirds of the cotton used is produced by China, India and USA. USA ranks number three after China and India in world cotton production but its cotton exports are almost one third of the cotton exports in the world and it is in the leading position. China (19%); Bangladesh (19%); Vietnam (17.3%); Indonesia (8.3%); Turkey (7.1%) and Pakistan (7.1%) are the important importing countries (USDA, 2019). Although China is an important cotton producer, it is the most important cotton importing country in the global markets due to the intensity of the ready-made clothing and textile industries. Bangladesh, Vietnam and Pakistan are also important importer countries. However, unlike China, the reason why they have become major importing countries can be expressed as the growth in the cotton industry based on imported cotton in these countries. Although Turkey is a cotton producer like China, it is the fourth biggest importing country due to the increasing needs in textile and ready-made clothing industries (Özüdoğru, 2017: 2).

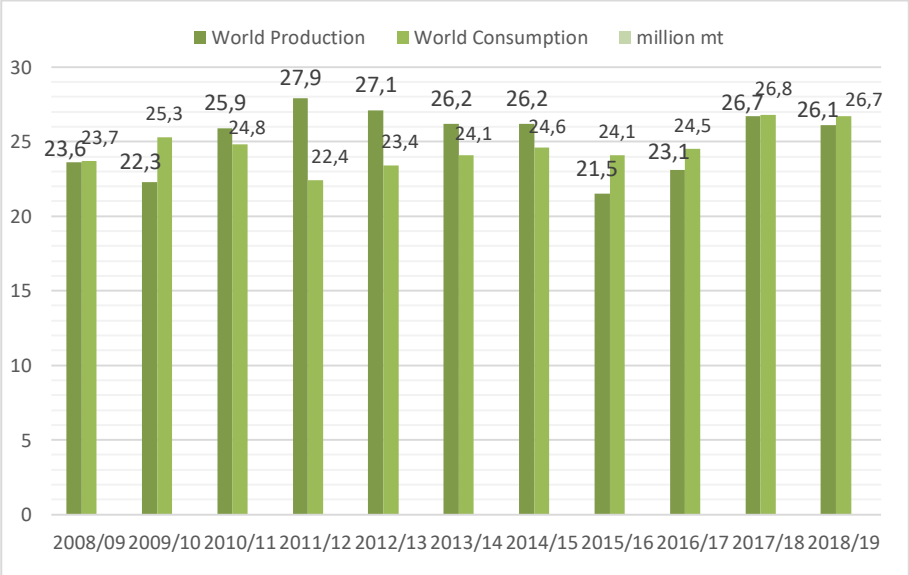
Due to the increase in cotton gin usage in nonproductive countries like Bangladesh and Vietnam, an increase is expected in world cotton trade in the third quarter of 2018-and it is also expected that China will increase its imports again in this season even though it is a big cotton and thread producer. On the other hand, it is estimated that USA will export more cotton in the period of 2018-2019, regardless of the decline in the period of 2017-2018. Similarly, it is estimated that the exports of India will decrease due to the decline in production and Brazil will export more due to the increase in its production in the period of 2017-2018 and will reach to 1.3 million tons in the period of 2018-2019 (USDA, 2018; 2019).

Table 1: World Cotton Supply and Demand (million tons)

	2016/2017	2017/2018	2018/2019	2019/2020
Beginning Stocks	90,19	80,31	80,94	77,53
Production	106,66	123,76	118,87	125,31
Import	37,70	41,02	42,45	44,74
Total Supply	234,56	245,11	242,27	247,59
Use	116,18	122,68	122,31	125,268
Exports	37,87	41,01	42,10	44,75
Loss	0,21	0,47	0,33	0,31
Ending Stocks	80,31	80,94	77,53	77,25

Source: *ICAC Report, 2019*

Figure 1: World Cotton Production and Consumption



***Source**: ICAC Report, 2019*

As the ecology of a limited number of countries is convenient for cotton growing, approximately 80% of the world production is made by eight countries, Turkey being one of them. In terms of organic cotton production, Turkey is one of the world's leading countries (Şahinli, 2011). Much the same with the rest of the world, Turkey has a limited land for cotton growing. The land convenient for cotton growing in Turkey is limited with Aegean and Mediterranean regions and some irrigable land in Southeastern Anatolia. Decisions of cotton farmers with regard to preferring cotton cultivation, ceasing or continuing to do so are important for the economy of our country (Bilgili et al., 2018). Depending on the prices and rates of support, cotton production undulates in Turkey. Turkey is definitely a cotton importing country. As opposed to exporting 27 thousand tons of cotton in 2000, 556 thousand tons of cotton was imported and these figures were 67 thousand tons and 914 thousand tons in 2017 respectively. 1.67 billion USD was paid for cotton importation in 2017 (Table 2).

Table 2: International Cotton Trade and Cotton Production of Turkey

Year	Export		Import		Cotton Unseed
	Quantity (ton)	Value (000 $)	Quantity (ton)	Value (000 $)	Production (ton)
2000	27.528	36.325	566.889	676.761	2.261
2005	40.982	54.814	775.685	908.359	2.240
2010	30.906	66.329	889.583	1.720.819	2.150
2011	54.581	149.385	604.161	1.850.334	2.580
2012	52.984	108.836	613.670	1.274.979	2.320
2013	50.279	102.822	869.285	1.681.872	2.250
2014	48.275	91.379	913.169	1.750.703	2.350
2015	51.139	79.967	802.970	1.233.224	2.050
2016	81.348	129.157	821.235	1.238.885	2.100
2017	67.143	123.982	914.498	1.676.614	2.450
2018	95.404	178.585	751.703	1.395.590	2.570

Source: *TUIK 2018 Cotton Report*

USA, Brazil, Turkmenistan, Greece, Australia and Syria are the leading countries in imports (Table 3). According to USDA report (2019), Turkey has a large textile industry, which steers the demand for cotton and will continue to import cotton in the forthcoming years due to the restrictions in cotton production.

Table 3: Turkey's Cotton Import Trade Matrix, Units: MT

Aug/July MY 2016/17		Aug/July MY 2017/18		Aug/Dec MY 2018/19	
U.S.	380,820	U.S.	388,076	U.S.	99,312
Brazil	84,830	Brazil	104,815	Brazil	33,987
Turkmenistan	77,538	Greece	103,525	Greece	32,766
Greece	74,685	Turkmenistan	49,998	Azerbaijan	22,657
Syria	25,691	Australia	49,637	Australia	19,465
Burkina Faso	24,721	Azerbaijan	26,638	Kyrgyzstan	3,135
Sudan	17,322	Syria	19,831	Sudan	3,209
Azerbaijan	17,106	Tajikistan	19,069	Benin	2,944
Tajikistan	14,772	Mali	18,814	Tajikistan	2,656
Australia	14,189	Sudan	16,091	Chad	2,099
Argentina	9,986	Benin	15,806	Turkmenistan	2,148
Total of others	360,840	Total of others	424,224	Total of others	125,066
Others not listed	59,347	Others not listed	63,911	Others not listed	17,509
Grand Total	801,007	Grand Total	876,211	Grand Total	241,887

Source: *https://gain.fas.usda.gov*

Table 4: Countries to which Turkey Exports Cotton (ton)

Countries	2015		2016		2017		2018 (Jan-Sept)	
	Quantity	%	Quantity	%	Quantity	%	Quantity	%
Italy	9865	19,29	7682	9,44	7590	11,31	4883	9,82
Netherlands	3935	7,70	4817	5,92	5078	7,56	2372	4,77
Germany	2718	5,32	5122	6,30	5958	8,87	3427	6,89
Poland	6488	12,69	5230	6,43	5523	8,23	2563	5,15
Russia	2719	5,32	2976	3,66	2785	4,15	2310	4,65
Spain	1951	3,82	5889	7,24	7673	11,43	3329	6,70
Bulgaria	1932	3,78	1778	2,19	1768	2,63	1187	2,39
Others	21530	42,10	47853	58,83	30766	45,82	29650	59,63
Total	51138	100	81347	100	67141	100	49721	100

Source: *TUIK 2018 Cotton Report*

2. MATERIALS AND METHODS

2.1. Panel Gravity Model

Many panel data analysis methods are used in many studies today. Panel data sets include both cross-sectional and time-series dimensions. Therefore, the analyses made by using panel data include the properties of cross-sectional and time-series. While panel data was previously applied to astronomy and agriculture, the field of its application was expanded to cover management, economy, sociology and psychology in conjunction with the advancements in theory, computer and statistical methods at the present time (Zheng et al., 2009: 163).

In this study the panel data regarding the countries to which Turkey has exported cotton between the years of 2002 and 2017 are used and the factors affecting Turkey's cotton exports are analysed with panel gravity model. The panel data set is constituted with the data regarding Turkey's cotton exportation obtained from Turkish Statistical Institute (TUIK), the data regarding Gross Domestic Product (GDP) (current value), Gross Domestic Product Per Capita (GDPP) (current value) and population variables of 22 countries[1] to which Turkey has exported between the years of 2002 and 2017 obtained from the database of the World Bank and the data regarding the D_{ij}(distance) variable obtained from (www.mapcrow.info) web address.

Gravity model was first adapted to the field of economics by Tinbergen (1962), Pöyhönen (1963) and Pulliainen (1963) with the intent of investigating the key determinants of international trade. Anderson (1979), Bergstrand (1985), Helpman (1985), Deardorff (1998), Anderson and Wincoop (2001) have contributed to the theoretical structure of gravity model. Gravity model was successfully applied to capital flows between

[1] 22 countries used in the study are as follows: France, Netherlands, Germany, Italy, Greece, Poland, Hungary, Romania, Albania, Ukraine, Russia, Azerbaijan, Uzbekistan, Serbia, Macedonia, Algeria, Canada, Cyprus, Lebanon, Israel, South Korea, Iraq

countries by Sandalcılar (2012), Kimura and Lee (2006), Ceglowski (2006), to migration by Karemera et al., (2000), Vogler and Rotte (2000), Lewer and Van den Berg (2008)), to international education Sa et al., (2004), Bessey (2012),VanBouwel and Veugelers (2013), Gündüz (2018); and to tourism by Karagöz (2008), Keum (2010), Santana-Gallego et al., (2016); Gündüz (2019). The field of interest of such an approach is composed of a broad literature and numerous empirical models based on gravity equations which investigate the key determinants of international trade. The model is based on Newton's "Law of Universal Gravitation". Newton's gravitation model argues that the gravity between two celestial objects is in direct proportion to their masses and in inverse proportion to the distance between them.

According to the "Universal Law of Gravity" proposed by Newton in 1687, the gravity force between the objects i and j is formulated as below (Achard, 2009).

$$E_{ij} = G\frac{(M_i \times M_j)^{\alpha}}{D_{ij}^{\gamma}} \quad (1)$$

E_{ij} represents the gravity force between the objects, M_i, represents the mass of the object i, M_j, represents the mass of the object j, D_{ij} represents the distance between two objects, G represents the gravitational constant. Gravity model addresses the trade between two countries in inverse proportion to the distance between them and in direct proportion to economic magnitude.

The standard gravity model shown with equation (1) is defined with equation (2) in linear form by taking the logarithms of both parties.

$$\ln E_{ij} = A + \alpha \ln(M_i \times M_j) - \beta \ln D_{ij} + \varepsilon_{ij} \quad (2)$$

In equation (2), α and β are the parameters to be estimated. ε_{ij} is a zero mean, constant variance error term.

$$\ln CE_{ijt} = \beta_0 + \beta_1 \ln GDP_{jt} + \beta_2 \ln GDPP_{jt} + \beta_3 \ln POP_{jt} + \beta_4 \ln LIN_{ijt} - \beta_5 \ln D_{ij} + \beta_6 EU + \beta_7 BR + \varepsilon_{ij} \quad (3)$$

In equation (3) i specifies Turkey, CE_{ijt} shows the amounts received from cotton exports made to countries (j) from Turkey in year t. GDP_{jt} and $GDPP_{jt}$ represent the Gross Domestic Product (GDP) value and the Gross Domestic Product per capita (GDPP) value of the exported country in year t, respectively. POP_{jt} represents the population values of countries j in year t and LIN_{ijt} represents the Linder variable. The Linder variable is represented by the difference between the per capita incomes of foreign trading countries. The increase seen in the trade intensity of the countries when the difference in income decreases supports the Linder hypothesis (Saygılı and

Manavgat, 2014). D_{ij} represents the distance between two countries, β_0 fixed term and ε_{ij} the error term. In addition, dummy variables which are expected to affect Turkey's cotton export potential are added to the model. The variable "EU "represents the status of the countries to which Turkey exports cotton in terms of EU membership and the other variable "BR " represents the border neighborhood of the countries.

3. RESULTS

Panel data analysis is used to estimate the gravity model for the variables used in the study. One of the basic assumptions in panel data models is that the error terms are independent of units, but there are also cases where errors have a simultaneous correlation along the cross sectional units. This prevents the correlation matrix to be a unit matrix as in auto-correlation and heteroscedasticity. Therefore, the assumption of uncorrelated units is tested. In this study, the existence of correlation between units was tested with Pesaran, Friedman and Frees tests.

Table 5: Results of Cross Sectional Dependence Test

	Test value	**p value**
Pesaran	2.389	0.016
Friedman	27.853	0.112
Frees	1.835	*Q Distribution Critical Values for* 0.05; 0. 2116

As it is seen in Table 5, according to the result of Friedman (p = 0.112> 0.05) the absence hypothesis of no correlation between the units cannot be rejected but it is rejected according to the results of Pesaran (p=0.016 < 0.05) and Frees (1.835 > 0.2116) test results. In this case, there is a cross-sectional dependence in this sample group according to Pesaran and Frees tests. In other words, it seems that there is a certain relationship between the error terms of the countries. For this reason, panel unit root test, which is based on the cross sectional dependency and cointegration analysis which is also based on the cross sectional dependency are used.

Table 6: Results of Unit Root Test

Variables	Level (0)		Level (I)	
	Z(t-bar)	p-value	Z(t-bar)	p-value
CE	-3.276	0.001	-	-
GDP	-4.032	0.000	-	-
GDPP	-4.441	0.000	-	-
LIN	-0.968	0.166	-5.960	0.000
POP	3.543	1.000	-2.039	0.021
DIST	19.543	1.000	18.039	1.000
BR	19.543	1.000	18.039	1.000
EU	19.543	1.000	18.039	1.000

As in all time-series analysis, in panel data analyses where time and cross-sectional analysis are made simultaneously, the variables should be constant so that there will be no reason for fake relationships (Baytar, 2012:

418). In order to determine if the variables include unit roots, the second generation panel unit root test is used in the form of Generalized Dickey Fuller (ADF) (1979) test, which are used in case of a correlation between the units (Table 6). According to the results, it is determined that the variables of exports, GDP and GDPP are constant at I(0) level. It is seen that Linder and population variables become constant, in other words I(1), when the primary differences are used. It is seen that the variables of distance, border neighborhood and European Union membership include unit roots.

In cases where the series include unit root, linear combinations of these series may be constant and the series may be interrelated in the long term. Existence of long-term relationships is tested with panel co-integration tests. In this case, it is decided that the cointegration relationship between these series can be examined.

Table 7: Results of Pedroni Panel Cointegration Test

Test	Statistical value	p- value
Panel v	-5.246	0.999
Panel rho	6.276	1.737e-10
Panel PP	-5.470	0.999
Panel ADF	-0.068	0.527
Grouprho	7.976	7.772e-16
Group PP	-6.745	1
Group ADF	-0.902	0.816

Existence of long term relationships between the series is tested with Pedroni panel cointegration test in the study (Table 7). When the results of Pedroni (1999) panel cointegration test are examined, the absence hypothesis of "there is no cointegration" at 5% significance level is not rejected in accordance with all statistics. In this case, it is concluded that there is no long-term relationship between the variables.

Table 8: Results of Heteroscedasticity and Autocorrelation Test

Otocorrelation *p value*		Heteroskedasticity *p value*
Durbin-Watson 1.46	Baltagi-Wu 1.647	0.000

In panel data models, the error term is assumed to be of equal variance within and by the units. Furthermore, it is assumed that the term error is not periodically correlated, that is not auto-correlated. However, this assumption is not met most of the time. Therefore, heteroscedasticity and auto-correlation problems are examined in the study before the estimation of the models. Wald test is used to determine if there is a heteroscedasticity problem in respect of units, Durbin Watson (DW) test and Baltagi-Wu (1999) locally best invariant (LBI) test is used to determine if there is an autocorrelation problem and the results are given in Table 8. Accordingly, the absence hypothesis of "there is no heteroscedasticity in respect of units" is rejected. Accordingly, there is a heteroscedasticity problem in respect of

units. The test statistic obtained from Durbin Watson (DW) and Baltagi-Wu (1999) locally best invariant (LBI) tests is smaller than 2 and it indicates that there is an autocorrelation problem in the model.

Table 9. Results of Driscoll Kraay Parameter Estimator

Variables	*Coef.*	*p-value*
GDP	0.224	0.001
GDPP	1.237	0.000
LIN	-0.512	0.001
POP	0.228	0.001
DIST	0.416	0.074
BR	0.064	0.884
EU	1.873	0.000
const.	8.405	0.002

The tests reveal that there are deviations from the assumptions. Therefore, Driscoll and Kraay estimator, which is resistant to deviations from the assumptions is used to estimate the parameters. According to parameter estimations given in Table 9, there is a statistically significant and positive directional relationship between the cotton exports of Turkey and economic indicators of target countries such as GDP and GDPP, while there is a statistically significant and negative directional relationship with Linder variable as expected. The quantities of cotton exports have a statistically significant and positive directional relationship with the variables of the populations of target countries and their EU membership. 1% increase in GDP and population of the countries to which Turkey exports cotton increases Turkey's cotton exports by 0.2% and 1% increase in their KBGDP increases Turkey's cotton exports by 1.2%. Moreover, Turkey's cotton exports increase by 1.8% if the country is an EU member. 1% increase in Linder results in a decrease in Turkey's cotton exports by 0.5%.

In the study conducted by Tatlıcı and Kızıltan (2011) on Turkey's exports, the variable of border neighborhood was found statistically insignificant and the study revealed that the share of the bordering countries in Turkey's exports is far less in proportion to the shares of EU member countries and other countries. In parallel with Tatlıcı and Kızıltan (2011), the variable of border neighborhood to Turkey is found statistically insignificant. Furthermore, the distance variable was also found statistically insignificant.

Conclusions

In this study, where the factors affecting Turkey's cotton exports between the years of 2002 and 2017 are analysed with panel gravity model, panel data of the countries to which Turkey exports cotton are used. In order to demonstrate the economic magnitudes as determinants of international trade flows between the years of 2002 and 2017, GDP and GDPP values of 22 countries to which Turkey exports cotton, the data related to population variable, distance variable, Linder variable and dummy variables are used to

constitute the panel data set. The researches have revealed that the international trade flows are positively affected by the economic magnitude of trading countries. In this study, it is determined that the quantity of Turkey's cotton exports has a positively oriented and statistically significant relationship with the economic indicators of target countries such as GDP and GDPP. At the same time, it is revealed that Linder variable has a statistically significant and negative directional relationship in line with the expectation of the hypothesis. Accordingly, it can be said that Turkey's level of trade with countries having approximate per capita income is higher.

A positively oriented relationship is found between the quantities of Turkey's cotton exports and the population of target countries. As the over-populated countries have more textile needs, they have higher demand for cotton. At the same time, the presence of cotton-based industries in the countries is an important factor. The variable of EU membership of the trading country is statistically significant. The advantages provided by the intercountry trade agreements ensure the continuity of trade and guaranty available markets for exporting countries, while they contribute to have a problem-free domestic supply chain. In addition to these, the variable of distance between Turkey and the countries to which Turkey exports cotton is found to be statistically insignificant contrary to expectations. The variable of border neighborhood does not have a significant effect on Turkey's cotton export either. Because the share of these countries in total cotton exports is quite low compared to EU member countries. Factors that may increase the competitive advantage in potential markets should be taken into consideration in terms of new market opportunities as the distance of trading countries does not have any effect. Particularly, policies of USA and China which are effective in world's market are important variables for Turkey as they are for other countries. Therefore, the policies of these countries should be carefully monitored when making any regulation.

Developing countries are trying to compete with developed countries such as USA, Australia and Greece in order to get a share in the global cotton export market. Economically more powerful countries such as China, India, Brazil and Turkey may play a more effective role in the global cotton market compared to African cotton producer countries and a few Asian producer countries which are among the least developed countries.

Cotton, which creates considerable added value in textile and ready-made clothing industries along with the employment opportunities it provides, is strategic agricultural product for Turkey. Continuity of cotton production is important for Turkey in terms of rural development and for textile and ready-made clothing industries which produce important export commodities. As in other countries, cotton farming is supported with incentives for production in Turkey on the one hand and brought under control with the restrictions of bilateral and multilateral agreements on the other hand. Apart from the cost which directly affects the prices in cotton production and trade, producer-industry-export subsidies, policies and costs

of rival countries, international treaties and exchange rate policies have important effects on prices. Particularly costs and exchange rate policies, adversely affect Turkey's cotton trade. Being at a disadvantage in world markets in terms of cost, sustainability of cotton production in Turkey depends on implementation and continuity of subsidies and regulations that reduce the input cost. In particular, income advantage of producers should be protected against alternative commodities.

In order for the production and trade to meet the demanded quality and quantity in textile industry and textile products, which are important foreign trade items, the raw material has to support it. Turkey is at a disadvantage in terms of cost compared to its rivals and further growing of this disadvantage of Turkish textile industry will be prevented with production of domestic raw material. If this can be done, it is even possible for Turkey to have a sustainable competitive advantage.

References

Abu Hatab, A., Romstad, E. (2014). Competitiveness Analysis of Egyptian Cotton Exports with Special Focus on the Chinese Market. *China Agricultural Economic Review*. 6(2). ss.248-263.

Achard, P. (2009). *The Regulation of International Air Cargo Services*. Master Thesis. Grouped'Economie Mondiale, Sciences Po.

Afridi, G. S., Saboor, A., Haq, Z., Tariq, S. A., Ishaq, M. (2016). Exploring Potential and Opportunities for Pakistan's Cotton Export. *Pakistan Journal of Agricultural Research*. 29(2). ss.188-201.

Akay, Ö., Yüksel, G. (2018). Clustering the Mixed Panel Dataset Using Gower's Distance And K-Prototypes Algorithms. *Communications in Statistics-Simulation and Computation*. 47(10). ss.3031-3041.

Akay, Ö., Yüksel, G. (2019). Hierarchical Clustering of Mixed Variable Panel Data Based on New Distance. *Communications in Statistics-Simulation and Computation*, 1-16. doi: 10.1080/03610918.2019.1588306

Alem, M., Elias, J. J. (2018). Allocating Production Risks Through Credit Cum Insurance Contracts: The Design and Implementation of a Fund for Small Cotton Growers to Access Market Finance. *Int. Food and Agribusiness Management Review.* 21(2). ss.237-248.

Anderson, J. E. (1979). A Theoretical Foundation for the Gravity Equation. *The American Economic Review*. 69(1). ss.106-116.

Anderson, J. E., Wincoop, E. V. (2001). Borders, Trade and Welfare. *National Bureau of Economic Research*, Working Paper 8515.

Baltagi, B. H., Wu, P. X. (1999). Unequally Spaced Panel Data Regressions with AR (1) Disturbances. *Econometric Theory*. 15(1). ss.814-823.

Baytar, R. A. (2012). The Determinants of Trade Volume Between Turkey and Bric Countries: A Gravity Model Analysis. *Istanbul Commerce University Journal of Social Sciences*. 21(1). ss.403-424.

Bassett, T. (2008). Producing Poverty: Power Relations and Price Formation in The Cotton Commodity Chains of West Africa. (Eds. W. Moseley & L. Gray), Hanging by a Thread: Cotton, Globalization and Poverty in Africa, Athens and Uppsala, Ohio University Press and The Nordic Africa Institute: 35-64.

Bashimov, G. (2015). Revealed Comparative Advantage of Turkish Cotton Sector. *International Research Journal of Social Sciences*. 4(7). ss.16-18.

Bashimov, G. (2016). Competitiveness Analysis of Turkmenistan's Cotton Sector. *Journal of Agricultural Faculty of Bursa Uludag University*. 30(1). ss.47-55.

Bergstrand, J. H. (1985). The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence. *Review of Economics and Statistics*. 67(3). ss.474-81.

Bessey, D. (2012). International Student Migration to Germany. *Empirical Economics*. 42(1). ss.345-361.

Bilgili, M. E., Yilmaz, H., Akkoyun, S., Vurarak, Y., Gül, M. (2018). Factors Affecting Cotton Production Decisions of Farmers: Eastern Mediterranean Region, Turkey. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*. 18(2). ss.41-51.

Campi, M., Dueñas, M. (2019). Intellectual Property Rights, Trade Agreements and International Trade. *Research Policy*. 48(3). ss.531-545.

Ceglowski, J. (2006). Does Gravity Matter in a Service Economy?. *Review of World Economics*. 142(1). ss.307-329.

Çelik, C., Kıral, G. (2018). *Panel Data Analysis in Examining Housing Sales: Examples of the Provinces of Turkey* (Ed. M.K. Terzioğlu and

S. Dal). Current Issues in Econometrics, Ankara: Gazi Publishing House. 123-140.

Çelik, C., Kıral, G. (2019). *The Hedonic Price Model to Determine the Factors That Affect Housing Prices in Turkey and Artificial Neural Networks*. Economic and Administrative Sciences, Ankara: Akademisyen Publishing House: 83-100.

Çiçek, R., Bashimov, G. (2016). Determination of Central Asia's Comparative Advantage in Cotton Trade. *Int. Journal of Management Economics and Busines*. 12(28). ss.1-14.

Deardorff, A. (1998). *Determinants of Bilateral Trade: Does Gravity Work in A Neoclassical World? In the Regionalization Of The World Economy*. University of Chicago Press: 7-32.

FAO. (2015). Measuring Sustainability in Cotton Farming Systems. Available from: http://www.fao.org/3/a-i4170e.pdf.

Gündüz, F. F., Gündüz, S., Yavuz, H. B. (2019). Analysis of the Factors Affecting the Demand for Turkey's Health Tourism: A Gravity Model Approach. *Igdır University Journal of Social Sciences.* 17(1). ss.717-739.

Gündüz, F. F. (2018). Analysis of International Student Mobility from Turkey via Erasmus+ Program. *Ankara Review of European Studies.* 17(2). ss.259-278.

Helpman, E. (1987). Imperfect Competition and International Trade: Evidence from Fourteen Industrial Countries. *Journal of the Japanese and International Economies*. 1(1). ss.62-81.

ICAC, (2019). World Cotton Supply and Demand. Available from: https://www.icac.org/home/index/

Jales, M. (2010). *How would a WTO Agreement on Cotton Affect Importing and Exporting Countries?*. ICTSD Programme on Agricultural Trade and Sustainable Development, Issue Paper, No.26, Geneva, Switzerland.

Karagöz, K. (2008). Tourism Potential of Turkey: Gravity Model Approach. *Anatolia A Journal of Tourism Research.* 19(2). ss.149-156.

Karemera, D., Oguledo, V. I., Davis, B. (2000). A Gravity Model Analysis of International Migration to North America. *Applied Economics*. 32(13). ss.1745-1755.

Keum, K. (2010). Tourism Flows and Trade Theory: A Panel Data Analysis with The Gravity Model. *The Annals of Regional Science*. 44(3). ss.541-557.

Kiani, A., Faysal, I., Siddique, M. A. (2018). Determinants of Agricultural Exports of Pakistan: An Application of Gravity Model. *The Dialogue.* 13(1). ss.467-478.

Kılıç, A. (2018). An Analysis of International Competitiveness Of Turkish Cotton in Accordance With Revealed Comparative Advantages: 2000-2009 and 2010-2016 Period. *Karadeniz-Blacksea-Черноеморе*. 39(39). ss.65-87.

Kimura, F., Lee, H. H. (2006). The Gravity Equation in International Trade in Services. *Review of World Economics*. 142(1). ss.92-121.

Küçük, N. (2015). The World of Cotton, Global Actors and Policies. *ASSAM Int. Refereed Journal*. 4(1). ss.60-85.

Lau, C. K. M., Bilgin, M. H. (2010). Export Conditions of The Chinese Textile Industry: An Analysis in Comparison with Selected ASEAN Countries. *Textile Research Journal.* 80(19). ss.2028-2045.

Lee, J., Karpova, E. E, Lee, M. J. (2014). Determinants of Apparel Exports in Developed Economies: Application of the Gravity Model and Economic Geography Theory. *Clothing and Textiles Research Journal*. 32(3). ss.139-152.

Lewer, J., Berg, V. H. (2008). A Gravity Model of Immigration. *Economics Letters*. 99(1). ss.164-167.

Liu, C. X., Chen, R. (2018). *Positive Analysis of Potential in China's Cotton Import*. In 4th Annual International Conference on Management, Economics and Social Development, Atlantis Press: 835-840.

MacDonald, S., Pan, S., Somwaru, A., Tuan, F. (2010). China's Role in World Cotton and Textile Markets: A Joint Computable General Equilibrium/Partial Equilibrium Approach. *Applied Economics*. 42(7). ss.875-885.

MacDonald, S. (2012). *Economic Policy And Cotton in Uzbekistan.* Economic Research Service of USDA: Washington, DC, USA, 2012: 1–26.

Meyer, L. (2018). *Cotton and Wool Outlook USDA*. Available from: https://www.ers.usda.gov/publications/pub-details/?pubid=87959.

Özer, O. O. (2014). Determinants of Turkey's Textiles Exportation: The Gravitation Model Approach. *Textile and Apparel*. 24(3). ss.252-258.

Özüdoğru, T. (2017). *Pamuk Durum ve Tahmin 2017/2018*. Republic Of Turkey Ministry Of Agriculture And Forestry Agricultural Economic And Policy Development Institute, 285:37.

Pedroni, P. (1999). Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors. *Oxford Bulletin of Economics and Statistics*. 61(1). ss.653-670.

Pöyhönen, P. (1963). A Tentative Model for the Volume of Trade between Countries. *Weltwirtschaftliches Archi.* 90(1). ss.93-100.

Pulliainen, K. (1963). A World Trade Study: An Econometnrc Model of the Pattern of the Commodity Flows of International Trade in 1948-60. *Economiska Sanmfundets Tidskrift.* 16(1). ss.78-91.

Quark, A.A. (2012). Scientized Politics and Global Governance in The Cotton Trade: Evaluating Divergent Theories of Scientization. *Review of International Political Economy*. 19(5). ss.895-917.

Ridley, W., Devadoss, S. (2014). US–B razil Cotton Dispute and the World Cotton Market. *The World Economy*. 37(8). ss.1081-1100.

Sa, C., Florax, R.J.G.M., Rietveld, P. (2004). Determinants of The Regional Demand for Higher Education in The Netherlands: A Gravity Model Approach. *Regional Studies*. 38(4). ss.375-392.

Sandalcılar, A.R. (2012). Turkey's Trade Potential with The Bric Countries: The Panel Gravity Model Approach. *Journal of Yasar University.* 25(7). ss. 4164-4175.

Santana-Gallego, M., Ledesma-Rodríguez, F., Pérez-Rodríguez, J. V. (2016). International Trade and Tourism Flows: An Extension of the Gravity Model. *Economic Modelling.* 52(1). ss.1026-1033.

Şahinli, M. A. (2011). Revealed Comparative Advantage Index: An Application on Turkey Cotton Industry. *The Journal of Social Economic Research.* 21(11). ss.227-240.

Tatlıcı, Ö., Kızıltan, A. (2011). Gravity Model: An Application on The Export of Turkey. *Atatürk University Journal of Economics and Administrative Sciences.* 25(1). ss.287-299.

Theriault, V. (2011). *Economics, Institutions, Development and Trade: Analysis of the Malian Cotton Sector*. (Unpublished PhD thesis), Food and Resource Economics Department, University of Florida, Florida.

Tinbergen, J. (1962). Shaping the World Economy: An Analysis of World Trade Flows. *New York Twentieth Century Fund*. 5(1). ss.1-117.

Turkish Statistical Institute (TUIK) (2018). *Cotton Report, Available from*: http://www.tuik.gov.tr/Start.do

USDA (2019). *Cotton: World Market and Trade,* https://www.fas.usda.gov/data/cotton-world-markets-and-trade, (Erişim: 26.9.2019).

Van Bouwel, L., Veugelers, R. (2013). The Determinants of Student Mobility in Europe: The Quality Dimension. *European Journal of Higher Education*. 3(2). ss.172-190.

Vogler, M., Rotte, R. (2000). The Effects of Development on Migration: Theoretical Issues and New Empirical Evidence. *Journal of Population Economics.* 13(3). ss.485-508.

Yanıkkaya, H., Koral, Z. (2013). Impacts of Agricultural Supports on Exports of Individual Agricultural Products in Turkey. *International Review of Economics and Management*.1(1). ss.1-37.

Zheng, T., Donghua, Z., Xuefeng, W., Bo, Y. (2009). *Panel Data Clustering and Its Application to Discount Rate of B Stock in China*. Second International Conference on Information and Computing Science. Manchester, UK: IEEE. 1:163-166.