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ÖZGÜN ARAŞTIRMA

Impact of Macroeconomic Indicators on Export Competitiveness in Shanghai Cooperation Organization Countries

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Abstract

The aim of the study is to determine macroeconomic indicators affecting export competitiveness of the Shanghai Cooperation Organization (SCO) countries. In the study covering the period 2000-2017, Balassa index was used to determine the export competitiveness of these countries. In the study, the effect of various macroeconomic indicators on export competitiveness of the SCO countries was analyzed using the AMG estimator. According to the results, only the current account deficit variable has negative effect on the competitiveness of crude materials except fuels product groups. Only the per capita income variable has a negative effect on the export competitiveness of the main manufacturing goods.

Keywords: Shanghai Cooperation Organization, Export Competitiveness, AMG Estimator

Jel Codes: F62, F13, C01

Şanghay İşbirliği Örgütü Ülkelerinde Makroekonomik Göstergelerin İhracat Rekabet Gücüne Etkisi

Özet

Çalışmanın amacı Şanghay İşbirliği Örgütü (ŞİÖ) üyesi ülkelerinin ihracat rekabet gücünü etkileyen makroekonomik göstergelerin saptanmasıdır. 2000-2017 dönemini kapsayan çalışmada, ülkelerin ihracat rekabet gücünün saptanması için Balassa indeksi kullanılmıştır. Çalışmada, çeşitli makroekonomik göstergelerin ŞİÖ ülkelerinin ihracat rekabet gücü üzerindeki etkisi AMG tahmincisi kullanılarak analiz edilmiştir. Elde edilen sonuçlara göre, sadece cari açık değişkeni yakıt ürün grupları dışındaki ham maddelerin rekabet gücü üzerinde olumsuz yönde etkilidir. Başlıca imalat mallarının ihracat rekabet gücü üzerinde ise sadece kişi başına düşen gelir değişkeni olumsuz yönde etkilidir.

Anahtar Kelimeler: Şanghay İşbirliği Örgütü, İhracat Rekabet Gücü, AMG Tahmincisi

Jel Kodları: F62, F13, C01

1. INTRODUCTION

Increasing the export and export competitiveness of countries is very important for their economic development and development. Moreover, the high level of export competitiveness of countries plays an important role in terms of their global competitiveness. However, the competitiveness of the countries are shown on a sectoral basis today. In other words, countries can compete globally with their sectoral superiority. In this context, countries with high added value and high competitiveness in the export of innovative products are seen as stronger global actors.

The aim of this study is primarily to calculate the export competitiveness of the members of the SCO (Russia, China, India, Kazakhstan, Kyrgyz Republic, Pakistan) on a sectoral basis. In the study, Tajikistan and Uzbekistan within the SCO countries could not be included in the analysis because of the data constraint. In this

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perspective, the revealed comparative advantage coefficients were used to calculate the export competitiveness of the countries in question. However, the study attempted to determine the macroeconomic determinants of the sectors with the highest export competitiveness in the SCO economies.

The study consists of three parts. In the first part, literature research was conducted and the difference between this study and other studies in the literature and the contribution of the study to the literature was tried to be revealed. In the second section, export competitiveness (Balassa index) of the SCO countries was calculated on a sectoral basis. In the third section, the macroeconomic determinants of the sectors in which the export competitiveness of the SCO countries was highest were estimated using the AMG estimator.

2. LITERATURE REVIEW

When the literature is examined, it is seen that there are many studies on macroeconomic variables affecting the competitiveness of countries. These studies analyzed the link between many macroeconomic variables and competitiveness, particularly economic growth. However, in most of these studies, the concept of competitiveness and its coefficients are used as global competitiveness prepared by the World Economic Forum (WEF). In other words, the concept referred to in the report as competitiveness is not the export competitiveness of countries for sectors (Terzić, 2017; Şener & Sarıdoğan, 2011; Kordalska & Olczyk, 2016; Amar & Hamdi, 2012; Emsina, 2014; Aliu, Knapkova & Musolli, 2017; Kowal & Pękosz, 2017; Cazacu, 2015; Baumann, 2011).

When the literature is examined, there are also studies examining the relationship between the sectoral export competitiveness of countries and various macroeconomic indicators, though not in large numbers. However, comparative advantage indices were not used as an indicator of export competitiveness in a significant number of these studies. In some of these studies, the ratio of net inflows in foreign direct investments to GDP, ratio of research and development expenditures to GDP, value added and labour productivity in industry and services sector were used as an indicator of competitiveness (Pilinkiene, 2016), In some studies, exports of transport equipment, fuels, capital products and chemicals sector (Gherman et al., 2013) and total goods and services exports, manufacturing sector exports, electronic goods exports, textile sector exports, rubber exports and wood exports (Mohamad et al., 2009) were used as an indicator of competitiveness. Furthermore, manufacturing exports of goods (Stojčić et al., 2012), exports of manufacturing goods per capita, share of manufacturing goods exports in total exports, share of medium and high-tech manufacturing goods exports in total manufacturing industry exports (Zhang, 2015) and the Hirschman-Herfindahl concentration index value also has been used as an indicator of competitiveness (Fafaliou & Polemis, 2013).

Very few studies in the literature have described the relationship between sectoral export competitiveness and various macroeconomic indicators using explained comparative advantage coefficients (e.g. the Balassa index). Gerni et al. (2013), examined the impact of competitiveness on economic growth in transition economies. In the study covering the period 1995-2009, the Balassa index was used as an indicator of industrial sector competitiveness. Panel ARDL (Autoregressive Distributed Lag) model was applied to 23 countries in the study. The results show that competitiveness in some sectors has a positive impact on economic growth, while in some sectors it has a negative impact (Gerni et al., 2013). In a study conducted by Muratoğlu and Muratoğlu (2016), for the period 1999-2010, the determinants of export competitiveness in the manufacturing industry sector of 12 OECD countries were analyzed. The Balassa index was used as an indicator of competitiveness. In the study, the impact of physical capital, labor cost, infrastructure, R&D, share of high-tech exports and foreign direct capital inflows on manufacturing sector export competitiveness were investigated by panel data analysis. The results showed that variables other than direct foreign capital inflows are decisive on export competitiveness (Muratoğlu & Muratoğlu, 2016).

In this study, analyzing macroeconomic determinants of export competitiveness and use of the Balassa's revealed comparative advantage index as an indicator of export competitiveness on a sectoral basis reveals the originality of the study and its contribution to the literature.

3. DATA SET AND METHOD

On the basis of selected goods groups, it is aimed to determine macroeconomic indicators affecting the competitiveness of the SCO countries in the sectors where there was competitive advantage. In line with the aim of the study, the sectors in which 6 SCO member countries had a competitive advantage (according to SITC Rev. 3; 2 digit classification) were identified. The Balassa index was used as the competitive advantage variable of the countries.

The most important measure of countries' export competitiveness is the Balassa index. The index is the ratio of a country's exports of a particular product to that country's total exports (Balassa & Noland, 1989). The formula for the index is as follows: (BI: Balassa index, j: the country, t: the period, k: the product group, w: world) (Balassa, 1965):

$$BI_{jkt} = \frac{X_{kt}^{j} / X_{t}^{j}}{X_{kt}^{w} / X_{t}^{w}} \quad (1)$$

The BI measures the country's relative trade performance in the export of certain goods and changes in the relative price differences of the factors of production (Messina, Bonnett, & Taylor, 2001).

If the index value is greater than one, the country has a competitive advantage in the export of the said product, vice versa. A value between 1 and 2 indicates weak superiority, a value between 2 and 4 indicates moderate superiority, and a value greater than 4 indicates strong superiority (Hinloopen & Marrewijk, 2001).

Table 1: Export Competitiveness of Countries By Product Group (SITC Rev.3 Classification)

	Group 0	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
China							1.28	1.29	3.24
India	1.43		1.57		2.37		2.28		1.69
Kazakhstan				2.97			1.16		
Kyrgyz Republic		1.85	4.11						
Pakistan	1.65		1.10				4.62		2.53
Russia			1.48	3.71		1.51	1.08		

Note: Sectors with competitive advantage (index value is above one) are shown according to the Balassa Index in the Table. Gaps indicate that there is no competitive advantage (index value is below one).

Table 2: Data Set and Sources

Variables	Definition of Variable	The Source of The Data
B2	The competitiveness of SITC Rev.3; 2 product group (crude materials, inedible, except fuels)	COMTRADE
B6	The competitiveness of SITC Rev.3; 6 product group (manufactured goods classified chiefly by material)	COMTRADE
B8	The competitiveness of SITC Rev.3; 8 product group (miscellaneous manufactured articles)	COMTRADE
RE	Real effective exchange rate	The World Bank
FDI	Foreign direct investment ($)	The World Bank
NX	Current account (%GSYH)	The World Bank
GD	Public debt (%GSYH)	The World Bank
UN	Unemployment rate (%)	The World Bank
GR	Growth rate (%)	The World Bank
CI	Per capita income ($)	The World Bank

In the study, the sectoral export competitiveness (the Balassa indices) of 6 countries were calculated and determined in which sectors they had a competitive advantage in common. Accordingly, four countries have competitiveness in the export of crude materials, inedible, except fuels (SITC Rev. 3; 2 product group), five countries have competitiveness in the export of manufactured goods classified chiefly by material (SITC Rev. 3; 6 product group) and three countries have competitiveness in the export of miscellaneous manufactured articles (SITC Rev. 3; 8 product group). In the study, the Balassa index scores of SITC Rev. 3; 2, 6 and 8 product groups were used as dependent variables in three separate models.

In the econometric model, seven macroeconomic indicators were used as independent variables, which were thought to have an effect on competitiveness. These variables are, respectively, real effective exchange rate, foreign direct investment, current account, public debt, unemployment rate, growth rate, per capita income. The variables consist of annual observations and cover the period 2000-2017. The definitions and data sources for these variables are shown in Table 2.

Three separate models have been established to determine macroeconomic indicators affecting sectors (B2, B6, B8) where the SCO countries have competitiveness. In the first model, Balassa index scores of SITC Rev.3; 2 product group (crude materials, inedible, except fuels) were used as dependent variables. In the second model, Balassa index scores of SITC Rev.3; 6 product group (manufactured goods classified chiefly by material) were used as dependent variables. In the third model, on the other hand, Balassa index scores of SITC Rev.3; 8 product group (miscellaneous manufactured articles) were used as dependent variables.

$$Y_{Bit2} = \propto_1 t + \propto_2 X_{REit} + \propto_3 X_{FDIit} + \propto_4 X_{NXit} + \propto_5 X_{GDit} + \propto_6 X_{UNit} + \propto_7 X_{GRit} + \propto_8 X_{CIit} + u_{it} \qquad (2)$$

$$Y_{Bit6} = \beta_1 + \beta_2 X_{REit} + \beta_3 X_{FDIit} + \beta_4 X_{NXit} + \beta_5 X_{GDit} + \beta_6 X_{UNit} + \beta_7 X_{GRit} + \beta_8 X_{CIit} + u_{it} \qquad (3)$$

$$Y_{Bit8} = \lambda_1 + \lambda_2 X_{REit} + \lambda_3 X_{FDit} + \lambda_4 X_{NXit} + \lambda_5 X_{GDit} + \lambda_6 X_{UNit} + \lambda_7 X_{GRit} + \lambda_8 X_{CÝit} + u_{it} \qquad (4)$$

In panel data analysis, the correlation (cross-section dependence) between the cross-section units that make up the panel affects the selection of tests to be used to investigate the possible unit root in the series. First generation unit root tests do not take into account the horizontal cross-section dependence between units. In case of cross-section dependence, second generation unit root tests should be used.

Second generation panel data analysis, which takes into account cross-section dependence and heterogeneity, was used as a method. In panel data analysis, the correlation between the cross-section units that make up the panel (cross-section dependence) affects the selection of tests to be used to investigate the possible unit root in the series. First generation unit root tests do not take into account this correlation between units. In case of cross-section dependence, second generation unit root tests should be used. Accordingly, in the empirical part of the study, cross-section dependence on variables was first determined using the Breusch and Pagan (1980) LM test, Pesaran (2004) scaled LM test and Pesaran (2004) CD tests. Then, the stasis of the series was investigated with appropriate unit root tests according to the section dependence state.

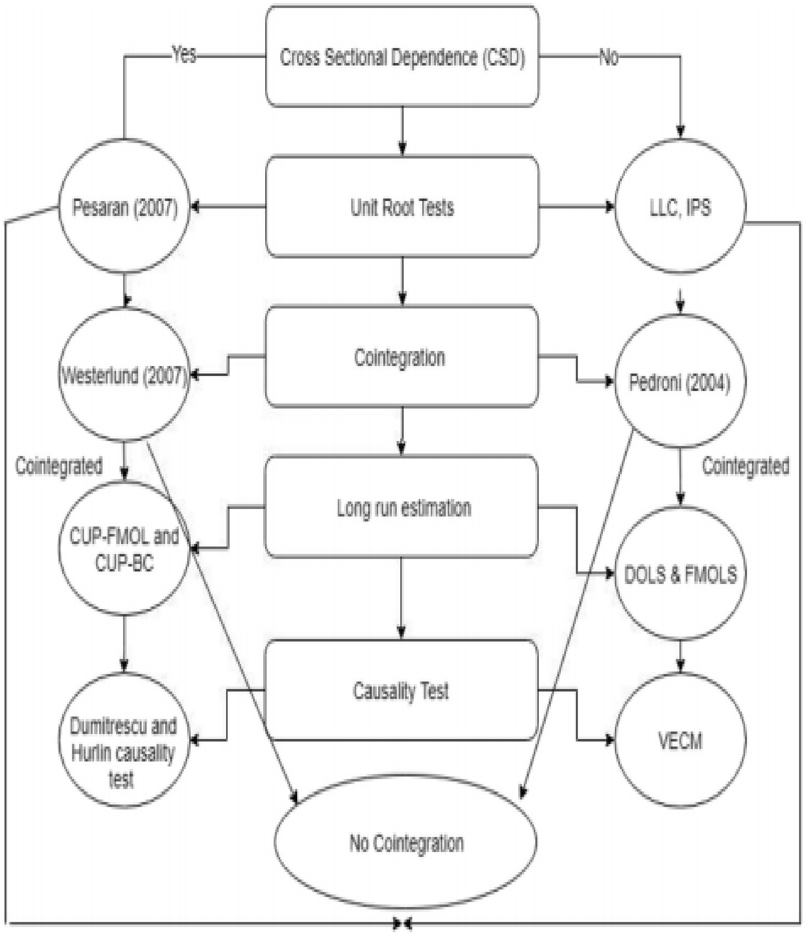

Figure 1: Stages of Panel Data Analysis Method **Source:** (Zaidi, Zafar, & Shahbaz, 2019)

When testing cross-section dependence, Friedman (1937), Frees (1995) and Pesaran (2004) cross-section dependence tests are used where the unit length of the panel data is greater than the time size. When the time size is greater than the unit size, Breusch and Pagan (1980) Lagrange Multiplier (LM) tests are preferred (Keskin & Aksoy, 2019). The Lagrange Multiplier (LM) test equation, developed by Breusch-Pagan in 1980 and based on the correlation coefficients of residues in $T \rightarrow \infty$ states, is calculated as follows:

$$LM = T \sum_{i=1}^{N-1} \sum_{J=i+1}^{N} \hat{P}_i^2 j \sim X_{N(N-1)/2} \quad (5)$$

$\hat{P}_i^2 j$ in the above equation shows the instant correlation between unit i and j. The null hypothesis of the Lagrange Multiplier (LM) test is in the form $H_0 : cov(u_{it}, u_{jt}) = 0$ (there is no cross-section dependence). Breusch and Pagan (1980) test is valid in the case of $T \rightarrow \infty$ while N is constant. However, this test loses its consistency property

Pesaran (2004) rearranged the formula as follows to address this situation:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{p}ij \right) \quad (6)$$

If N is infinite and T is large enough, the null hypothesis stating that there is no cross-section dependence fits the distribution of CD ~ N(0,1). In case the null hypothesis is rejected, it is decided that there is no cross-sectional dependence between units (Keskin & Aksoy, 2019).

The Breusch and Pagan (1980) test will yield deviant results while the group average is zero and the individual average is different from zero. Pesaran, Ullah and Yamagata (2008) corrected this deviation by adding variance and mean to the test statistic. The adjusted test statistic (LM_{adj}) is calculated as follows (Pesaran, Ullah, & Yamagata, 2008):

$$LM_{adj} = \sqrt{\left(\frac{2}{N(N-1)}\right)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \frac{(T-k)\hat{p}_{ij}^2 - \mu_{Tij}}{v_{Tij}} \quad (7)$$

μ_{Tij} represents the mean and v_{Tij} represents the variance. This test statistic will show asymptotically the standard normal distribution. The hypotheses of the test are given as follows:

$$H_0 : cov(u_{it}, u_{jt}) = 0$$

$$H_1 : cov(u_{it}, u_{jt}) \neq 0$$

The rejection of the H0 hypothesis at the level of significance α indicates that there is a cross-sectional dependence between the units forming the panel (Pesaran, Ullah, & Yamagata, 2008). Homogeneity of cointegration coefficients is important in determining appropriate unit root and cointegration tests in panel data analysis. The first studies on the homogeneity of cointegration coefficients were conducted by Swamy (1970).

$$y_{it} = \alpha_i + \beta_i' x_{it} + \varepsilon_{it} \quad (8)$$

In the equation, *i* refers to the number of cross-section units, *t* refers to the time period, y_{it} refers to the value of unit *i* of the dependent variable at *t* time, x_{it} refers to the value of unit *i* of the independent variable at *t* time and ε_{it} refers to the error term with zero mean and constant variance. The presence of cross-section dependence affects the selection of the appropriate unit root test.

The first generation tests are divided into two according to the fact that the cross sections are homogeneous or heterogeneous. Levin, Lin and Chu (2002), Breitung and Das (2005), and Hadri (2000) tests are based on the assumption of homogeneity. Im, Pesaran and Shin (2003), Maddala and Wu (1999), and Choi (2001) tests are based on the assumption of heterogeneity. The CADF test was applied to the second generation panel unit root test which takes into account the cross-section dependence as there is cross-section dependence among the variables. The T statistical value of the CADF test is calculated as follows (Pesaran, 2007):

$$t_i(N,T) = \frac{\Delta \acute{Y}_i \overline{M_w} Y_{t-1}}{\delta(\acute{Y}_{t-1} \overline{M_w} Y_{t-1})^{1/2}} \quad (9)$$

In this test, the standard ADF regression is extended by the first differences of the cross-sections and the cross-section averages of the delayed values. The unit root test can be used in both T>N and N>T situations. In addition, this unit root test allows examination of stasis for both cross-sections and the entire panel. The CADF test is based on the following regression model (İlgün, 2016).

$$CA\bar{D}F = \frac{\sum_{i=1}^{N} CADF_i}{N} \quad (10)$$

The findings obtained as a result of panel unit root tests are of great importance for panel cointegration tests. When making assumptions of panel cointegration tests, the degrees of stasis of the variables change the type of test that will be applied. The series covered in the study partly includes cross-sectional dependence. This necessitates the use of second-generation cointegration tests which take into account the cross-sectional dependence in panel cointegration tests.

Westerlund (2007) developed a four-panel cointegration test that takes into account the cross-section dependence and is based on the error correction model. Two of these tests are called group average statistics and the other two are called panel statistics. In the Westerlund error correction test, the following model is first estimated with the Dynamic Least Squares Method (DOLS) for calculating panel statistics.

$$\Delta Y_{it} = \delta_1 d_t + \lambda_1 X_{it-1} + \sum_{j=1}^{pi} a_{ij} \Delta Y_{it-i} + \sum_{j=0}^{pi} \lambda_1 \Delta X_{it-j} + e_t \quad (11)$$

The length of the delay is determined by the traditional selection criterion in the model. Group average statistics (Ga and Gt) and panel statistics (Pa ve Pt) statistics are calculated after $\hat{e}i_t$ and $\hat{\gamma}_{ij}$ are obtained in the model. For group statistics;

H_0: σ_i^2 = 0, there is no cointegration relationship between the series.

H_1: σ_i^2 >0, there is cointegration relationship between the series.

The hypothesis is tested as follows:

$$G_t = \frac{1}{N}\sum_{i=1}^{N} \frac{a}{S.E\ (a)} \sim N(0,1) \qquad (12)$$

$$G_a = \frac{1}{N}\sum_{i=1}^{N} \frac{Ta}{a\ (1)} \sim N(0,1) \qquad (13)$$

First, the following equations are estimated by the dynamic least squares method for P_a ve P_t statistics.

$$\Delta\tilde{y}_{it} = \Delta y_{it} - \hat{\delta}_i d_t - \hat{\lambda}_i X_{i,t-1} - \sum_{j=1}^{pi} \hat{\alpha}_{ij}\, \Delta Y_{i,t-i} - \sum_{j=-qi}^{pi} \hat{\gamma}_{ij} \Delta X_{i,t-j} \qquad (14)$$

$$\hat{y}_{i,t-1} = y_{i,t-1} - \hat{\lambda}_i X_{i,t-1} - \sum_{j=1}^{pi} \hat{a}_{ij} \Delta Y_{i,t-i} - \sum_{j=-qi}^{pi} \hat{\gamma}_{ij} \Delta X_{i,t-j} \qquad (15)$$

After the model estimate, the error correction coefficient and standard error are calculated for the entire panel.

$$\hat{\alpha} = \left[\sum_{i=1}^{N}\sum_{t=2}^{T} (\tilde{Y}_{it-1})^2\right]^{-1} \sum_{i=1}^{N}\sum_{t=2}^{T} \frac{1}{\hat{a}_i(1)} \tilde{Y}_{it-1} \Delta\tilde{Y}_{it} \qquad (16)$$

$$S.E(\hat{\alpha}) = \left[(\hat{S}_n)^2 \sum_{i=1}^{N}\sum_{t=2}^{T} (\tilde{Y}_{it-1})^2\right]^{-1/2} \qquad (17)$$

Finally, the panel cointegration statistics are calculated as follows:

$$P_t = \frac{a}{S.E\ (a)} \sim N(0,1) \qquad (18)$$

$$P_a = T_a \sim N(0,1) \qquad (19)$$

The null and alternative hypothesis of panel statistics calculated in three stages is expressed as follows:

$H0$: $ai = 0$, for all crosssectional units, there is no cointegration relationship.

$H1$: $ai < 0$, for all crosssectional units, there is cointegration relationship.

In the panel cointegration test developed by Westerlund (2007), the assumption made when comparing with the standard normal distribution critical value is that there is no dependence between the cross-sections that make up the panel. Westerlund (2007) proposes that test statistics calculated to take into account cross-section dependence should be compared with "bootstrap" distribution critical values. Long-term coefficients are estimated in order to determine the direction of the relationship in the case of a cointegration relationship between the variables. In case of cross-section dependency, the Augmented Mean Group (AMG) estimator that offers an effective analysis in estimation of long-term coefficients is used.

4. ANALYTICAL FINDINGS

On the basis of selected commodity groups, before examining the impact of macroeconomic indicators affecting the export competitiveness of the SCO countries, we investigated whether there is a dependency between the sections that make up the panel. The lack of cross-sectional dependence is based on the assumption that all countries are affected by a shock to any of the units that make up the panel, and that the other countries that make up the panel are not affected by a macroeconomic shock. The results obtained in the analysis without considering the cross-section dependence will be deviant and inconsistent. The LM (Lagrange Multiplier) test developed by Breusch and Pagan (1980) and the CD (Cross-section Dependent) test developed by Pesaran (2004) were used to measure cross-section dependence. It is assumed that the probability values are asymptotically normal distribution.

Table 3: Cross-section Dependency Test

LM ve CD Test	B2		B6		B8	
	Statistical value	P-value	Statistical value	P-value	Statistical value	P-value
LM	18.700	0.2275	20.110	0.1678	49.30	0.0000*
LM adj	-4.123	0.0000*	-3.888	0.0001*	1.003	0.3159
LM CD	0.3317	0.7401	-1.945	0.0518	5.476	0.0000*

Note: (*) shows cross-section dependence at the level of 1% significance.

The Ho hypothesis has been established that there is no cross-sectional dependence between variables relative to country groups. As seen in Table 3, according to LM, LM adj. and LM CD tests, since the probability values are less than 0.05, the H0 hypothesis was rejected at the level of 1% significance and it was determined that there is cross-sectional dependence in the series.

Table 4: Unit Root Test Results

Variable	CADF test	P Value
B2	-2.031	0.237
B6	-1.047	0.958
B8	-2.379*	0.061
RE	-1.635	0.590
FDI	-2.923**	0.002
NX	-2.091	0.195
GD	-0.981	0.963
UN	-2.553**	0.025
GR	-2.392*	0.058
CI	-1.189	0.901

(***), (**) ve (*) It shows that the H_0 hypothesis is rejected at the level of significance of 1%, 5%, and 10%, respectively. CADF critical values are -2.6, -2.34 and -2.21, respectively, at 1%, 5% and 10% significance levels.

Because the model had cross-section dependence, Pesaran CADF (Cross-sectionally Augmented Dickey Fuller), which is a second generation unit root test that takes into account cross-section dependence was applied. The H0 hypothesis of this test is established as "the serial unit under the cross-section dependence contains the root". In this context, according to the results obtained in Table 4, the variables B2, B6, RE, NX, GD and CI contain unit root, while the variables B8, FDI, UN and GR are stable at the level. Accordingly, the degrees of cointegration between variables are different. For this reason, the Westerlund cointegration test, which takes into account the different degrees of integration together, was applied.

In panel data analysis, it is important to determine homogeneity of cointegration coefficients for appropriate unit root and cointegration tests. The S test developed by Swamy (1970) was used on the homogeneity of the cointegration coefficients. According to the test, βi denotes the slope coefficient in the equation $Yit = \alpha + \beta itXit + \varepsilon it$. If $H0: \beta i = \beta$, slope coefficients are homogeneous. Swamy S test was applied to determine whether the cointegration coefficients were homogeneous in the model (Swamy, 1970).

Table 5: Swamy S Homogeneity Test

B2					
Variable	Coef.	Std. Err.	p>|z|	[95 % Conf. Interval]	
RE	-0.027125	0.024863	0.275	-0.075855	0.0216061
FDI	-6.76E-10	8.45E-10	0.424	-2.33E-09	9.81E-10
NX	464282	0.029557	0.116	-0.1043592	0.0115028
GD	-0.002386	0.008737	0.785	-0.0195097	0.0147379
UN	0.1064192	0.154907	0.492	-0.1971931	0.4100315
GR	0.0038142	0.015686	0.808	-0.0269305	0.0345588
CI	0.0004679	0.000334	0.161	-0.0001868	0.0011226
_cons	3.474435	1.860121	0.062	-0.1713352	7.120204
Test of parameter constancy	Chi(40) = 383.43		Prob>chi2 = 0.0000		
B6					
Variable	Coef.	Std. Err.	p>|z|	[95 % Conf. Interval]	
RE	-0.002729	0.012034	0.821	-0.026315	0.208566
FDI	-	-	-	-	-
NX	0.0195549	0.027442	0.476	-0.0342303	0.0733402
GD	0.0158335	0.020877	0.448	-0.0250837	0.0567507
UN	-0.227902	0.298654	0.445	-0.8132528	0.357449
GR	0.0770583	0.066957	0.25	-0.0541742	0.2082907
CI	0.0000449	0.000302	0.882	-0.0005477	0.0006376
_cons	2.608663	1.667406	0.118	-0.6593924	5.876719
Test of parameter constancy	Chi(40) = 836.67		Prob>chi2 = 0.0000		
B8					
Variable	Coef.	Std. Err.	p>|z|	[95 % Conf. Interval]	
RE	0.0095623	0.016737	0.568	-0.0232417	0.0423664
FDI	-2.35E-10	3.62E-10	0.517	-9.44E-10	4.75E-10
NX	0.0464839	0.102381	0.65	-0.1541781	0.2471459
GD	-0.096579	0.124899	0.439	-0.3413757	0.1482177
UN	0.2423842	0.209262	0.247	-0.167761	0.6525294
GR	0.0065608	0.102086	0.949	-0.1935241	0.2066458
CI	0.0003183	0.001101	0.772	-0.0018392	0.0024757
_cons	4.208935	6.134317	0.493	-7.814106	16.23198
Test of parameter constancy	Chi(40) = 157.75		Prob>chi2 = 0.0000		

(*) It shows heterogeneity of variables at 5% level.

The H0 hypothesis was rejected because the probability value of homogeneity tests calculated in Table 5 (Prob > chi2 = 0.0000) is less than 0.05. The result is that the constant coefficient and slope coefficients in the model are heterogeneous. This indicates that the regression coefficients may vary according to each cross-sectional unit and that the equalization interpretations for all the countries in the panel will be valid and reliable.

The panel cointegration test, which was developed by Westerlund (2005) can be used in both cases where there is cross-sectional dependence, vice versa (Westerlund, 2005). If there is no cross-section dependence between the countries that make up the panel, the asymptotic probability values of the test are taken into account. On the contrary, the bootstrap probability values of the test are taken into account if there is a cross-section dependence. Both asymptotic and bootstrap probability values are compared with 0.05 to determine the presence of cointegration at 5% significance level. In case the probability value of the calculated test is less than 0.05, H0 is rejected and it is decided that there is a cointegration relationship between the series.

According to the Westerlund panel cointegration test result, which takes into account the dependence of the cross section, The basic hypothesis that the variables B2 and B6 have "no cointegration" in Gt and Pt statistics cannot be rejected. The fact that these coefficients are less than 0.05 indicates the cointegration relationship. However, since the probability values of the Gt and Pt parameters of the B8 variable are greater than 0.05, there was no cointegration relationship between the series.

Since there is a correlation between B2 and B6 variables, long-term coefficients were obtained and the interaction between competitiveness and macroeconomic indicators was examined both collectively and on a country basis. The AMG estimator, which provides an effective analysis of long-term coefficients was used because of the cross-section dependence (Eberhardt & Bond, 2009).

Table 6: Westerlund Panel Cointegration Test

Statistics	B2			B6			B8		
	Value	Z-Value	P-Value	Value	Z- Value	P- Value	Value	Z- Value	P- Value
Gt (Group Average)	-10.88	-21.64	0.000*	-16.99	-37.31	0.000*	-2.716	-0.696	0.243
Ga (Group Average)	-0.479	3.989	1.000	-1.587	3.635	1.000	-12.09	0.275	0.608
Pt (Panel)	-11.10	-5.393	0.000*	-36.66	-28.98	0.000*	-5.267	-0.004	0.499
Pa (Panel)	-1.124	2.643	0.996	-2.560	2.179	0.985	-7.639	0.539	0.705

(*) It shows that there is a cointegrated relationship at the level of 5% significance.

Table 7: Estimation of Long – Term Coefficients (AMG) - For All Countries

The Augmented Mean Group Estimator						
Variables	B2		B6		B8	
	Coefficient	P>Z	Coefficient	P>Z	Coefficient	P>Z
RE	-0.00475	0.403	0.00935	0.120	-0.03327	0.245
FDI	-2.91E-10	0.244	3.13E-12	0.960	-2.39E-10	0.408
NX	-0.04823	0.039*	-0.01665	0.296	0.027702	0.716
GD	0.001946	0.802	0.00113	0.906	-0.0165	0.619
UN	0.115755	0.264	-0.17129	0.189	0.447787	0.185
GR	0.00203	0.776	0.03750	0.173	-0.01797	0.672
CI	-0.00036	0.619	-0.00031	0.028*	0.001103	0.046*
__00000R_c	0.661989	0.296	0.84352	0.209	0.83865	0.027
_cons	1.639438	0.014	2.31221	0.012	6.929473	0.177
Root Mean Squared Error (sigma)	0.2365		0.17364		0.3153	

(*) It is meaningful at 5% level.

Table 8: Estimation of Long – Term Coefficients (AMG) - For Each Country

Countries	Variables	B2 Coefficient	B2 P>Z	B6 Coefficient	B6 P>Z	B8 Coefficient	B8 P>Z
		Augmented Mean Group Estimator					
	RE	0.007553	0.081	-0.00152	0.691	-0.09884	0.011*
	FDI	-6.52E-13	0.536	-1.84E-12	0.011*	2.18E-11	0.006*
	NX	-0.02024	0.079	-0.01717	0.111	0.329614	0.007*
	GD	-0.02054	0.254	-0.04024	0.001*	0.071508	0.593
CHINA	UN	-0.0185	0.929	0.014898	0.942	1.948789	0.167
	GR	0.008871	0.809	0.040621	0.312	-0.21838	0.526
	CI	-7.22E-06	0.922	0.000173	0.002*	0.000119	0.831
	__00000R_c	0.02002	0.783	-0.30945	0.029	2.201947	0.000
	_cons	0.387756	0.725	2.009859	0.117	11.74364	0.152
	B2 (dependent)	Coefficient	P>Z	Coefficient	P>Z	Coefficient	P>Z
	RE	-0.02559	0.159	0.019617	0.004*	-0.1443	0.000*
	FDI	-6.25E-12	0.401	-6.86E-12	0.016*	1.85E-11	0.238
	NX	-0.11573	0.022*	0.037942	0.046*	-0.24973	0.021*
	GD	-0.01423	0.548	0.001742	0.86	-0.16438	0.001*
INDIA	UN	0.148512	0.558	-0.00045	0.996	0.882084	0.069
	GR	0.00722	0.797	-0.01942	0.089	0.073129	0.208
	CI	0.000591	0.254	-0.00065	0.001*	0.002632	0.018*
	__00000R_c	0.076992	0.511	-0.20252	0.212	1.751638	0.000
	_cons	4.018123	0.222	1.241659	0.313	30.24055	0.000
	B2 (dependent)	Coefficient	P>Z	Coefficient	P>Z	Coefficient	P>Z
	RE	0.001415	0.920	0.031123	0.28	0.015113	0.159
	FDI	-1.29E-12	0.943	1.72E-11	0.641	2.42E-11	0.032*
	NX	0.019822	0.364	-0.03274	0.440	-0.00944	0.476
	GD	0.0304	0.256	0.030741	0.570	-0.04163	0.016*
KAZAKHSTAN	UN	-0.04963	0.564	-0.28913	0.106	-0.11266	0.328
	GR	0.023757	0.484	0.058585	0.392	-0.00633	0.782
	CI	-7.6E-05	0.300	-0.0003	0.039*	4.95E-05	0.319
	__00000R_c	0.076719	0.553	0.801448	0.299	0.756782	0.000
	_cons	1.031099	0.378	1.365854	0.593	3.388617	0.003
	B2 (dependent)	Coefficient	P>Z	Coefficient	P>Z	Coefficient	P>Z
	RE	0.010991	0.877	0.004321	0.815	0.01363	0.850
	FDI	-1.53E-09	0.070	2.46E-10	0.382	-1.68E-09	0.032*
	NX	-0.11375	0.038*	-0.00200	0.902	0.082829	0.142
	GD	0.012684	0.539	-0.00543	0.323	0.009084	0.760
KYRGYZ REPUBLİC	UN	0.606092	0.009*	0.013071	0.841	-0.14775	0.526
	GR	0.003346	0.952	-0.01500	0.316	-0.00649	0.907
	CI	-0.00378	0.136	-0.00071	0.327	0.002974	0.276
	__00000R_c	3.826414	0.000	0.644747	0.154	0.238613	0.435
	_cons	-0.34896	0.951	0.706096	0.634	-0.37058	0.949
	B2 (dependent)	Coefficient	P>Z	Coefficient	P>Z	Coefficient	P>Z
	RE	-0.01346	0.302	0.012135	0.551	0.015015	0.597
	FDI	-2.18E-10	0.028*	-2.37E-10	0.027*	1.77E-10	0.258
	NX	-0.05655	0.219	-0.08014	0.199	0.003627	0.963
	GD	-0.00586	0.790	0.008204	0.785	0.026562	0.446
PAKISTAN	UN	0.076179	0.645	-0.77551	0.000*	0.109837	0.612
	GR	-0.02911	0.623	0.159703	0.029*	0.053825	0.523
	CI	0.001198	0.082	-0.00036	0.705	0.000828	0.602
	__00000R_c	0.045944	0.854	4.07496	0.000	-0.01419	0.928
	_cons	1.746814	0.283	6.810766	0.003	-3.80764	0.237
	B2 (dependent)	Coefficient	P>Z	Coefficient	P>Z	Coefficient	P>Z
	RE	-0.0094	0.147	-0.00954	0.015*	-0.00024	0.908
	FDI	6.57E-12	0.000*	1.90E-12	0.040*	7.61E-13	0.116
	NX	-0.00293	0.815	-0.0058	0.408	0.009303	0.009*
	GD	0.009222	0.031*	0.011821	0.000*	-0.00012	0.919
RUSSIA	UN	-0.06812	0.141	0.009404	0.671	0.006422	0.570
	GR	-0.0019	0.797	0.000572	0.889	-0.00359	0.089
	CI	-6.2E-05	0.008*	-1.2E-05	0.385	1.46E-05	0.030*
	__00000R_c	-0.07416	0.121	0.051966	0.448	0.097108	0.000
	_cons	3.001796	0.000	1.739045	0.000	0.38226	0.000

(*) It is meaningful at 5% level.

When all countries are evaluated collectively based on the results obtained from the AMG estimator, it is seen that only the current account deficit variable has an effect on the B2 (Table 7). It is understood that the competitiveness of countries decreases as the current account deficit increases. The impact of other macroeconomic indicators on competitiveness is statistically meaningless. It is observed that there is a negative relationship between the B6 and the level of national income per capita. It can be stated that the relationship in question is in line with the theoretical expectation since the tendency of people to import higher income level will be high. Finally, it is seen that there is a negative effect between the B8 and the level of national income per capita. The effects of other macro magnitudes on competitiveness appear to be statistically meaningless.

When the degrees of competitiveness of each country is different in certain product groups, each country has different levels of competitiveness in specific product groups. Table 7 shows long-term coefficients by country.

When the long-term coefficients are examined on a country basis and the export competitiveness is taken into account; in Russia, it is observed that the B2 is affected negatively by per capita income and positively by foreign direct investment and public debt. Furthermore, the B6 is affected negatively by real exchange rate and positively by foreign direct investment and public debt. The B8 is affected positively by current account and per capita income.

The B6 is affected negatively by foreign direct investment and public debt and positively by per capita income in China. Also, the B8 is affected positively by foreign direct investments and current account and negatively by real exchange rate. As the product group changes, the factors that affect the competitiveness differ.

In India, the B2 is affected negatively by current account. The B6 is affected negatively by foreign direct investment and per capita income and positively by real exchange rate and current account. The B8 is affected negatively by public debt, real exchange rate and current account and positively by per capita income.

The B6 is affected negatively by per capita income. The B8 is affected positively by direct investments and negatively by public debt in Kazakhstan.

In Kyrgyz Republic, the B2 is affected negatively by current account and positively by unemployment rate. The B8 is affected negatively by foreign direct investment.

The B2 is affected negatively by foreign direct investment in Pakistan. In addition, the B6 is affected positively by growth rate and negatively by foreign direct investment and unemployment rate.

When the results are examined as a whole, it is seen that the current account and the real exchange rate have a negative impact on export competitiveness. However, the responses of other macroeconomic indicators to different product groups vary.

5.CONCLUSION

In the study, the results obtained by calculating the export competitiveness of the SCO countries on a sector basis with the help of the Balassa index showed that the said countries had the highest scores in the product groups of "crude materials, inedible, except fuels, manufactured goods classified chiefly by material and miscellaneous manufactured articles". Furthermore, when the mentioned product groups are taken into account, the SCO countries have the competitiveness in the export of raw material and labor-intensive products.

The sectoral export competitiveness of countries can be affected by many macroeconomic indicators. In this study, it is investigated that the impact on export competitiveness of real effective exchange rate, foreign direct investment, current account, public debt, unemployment rate, growth rate, per capita income in this countries.

When the results obtained using the AMG estimator are evaluated on the basis of all countries, only the current account has negative effect on the export competitiveness of crude materials, inedible, except fuels. The export competitiveness of manufactured goods classified chiefly by material and miscellaneous manufactured articles is negatively affected only by per capita income. There was no statistically significant relationship with other macroeconomic indicators.

As a result, the macroeconomic indicators that influence the export competitiveness of raw material and labor-intensive product groups in the SCO countries are the current account and per capita income. Both have a negative impact on the export competitiveness of these products. In order to reduce their current account deficits, these countries need to increase their competitiveness in the export of these products. Furthermore, it is obvious that the increase in per capita income will increase the demand for imported goods (especially high value added and technological goods). This will result in countries becoming more dependent on imports and reduced competitiveness. In this perspective, these countries need to specialize in the export of high value added and innovative product groups in order to increase their global competitiveness..

REFERENCES

ALIU, F., KNAPKOVA, A., MUSOLLI, N. (2017). Modeling the Fundamental Value of a Company: a Case Study of Electricity Distribution and Supply Company (keds). *The 4th International Conference on Finance and Economics* (225-236). Vietnam: ICFE.

AMAR, M. B., HAMDI, M. T. (2012). Global Competitiveness and Economic Growth: Empirical Verification for African Countries. *International Journal of Economics and Finance, 4*(6), 125-131.

AUZINA-EMSINAA, A. (2014). Labour Productivity, Economic Growth and Global Competitiveness in Post-Crisis Period. *Procedia - Social and Behavioral Sciences, 156*, 317-321.

BALASSA, B. (1965). Trade Liberalisation and "Revealed" Comparative Advantage. *The Manchester School of Economic and Social Studies*, 99-123.

BALASSA, B., NOLAND, M. (1989). Revealed Comparative Advantage in Japan and the United States. *Journal of International Economic Integration, 4*(2), 8-22.

BAUMANN, C. (2011). The role of culture, competitiveness and economic performance in explaining academic performance: a global market analysis for international student segmentation. *Journal of Marketing For Higher Education, 21*(2), 181-201.

CAZACU, A.-M. (2015). Determinants of Non-performing Loans Ratio. Evidence from Firm-level Data. *International Finance and Banking Conference* (354-358). Bucharest, Romania: IFBA.

EBERHARDT, M., BOND, S. (2009). Cross-section dependence in nonstationary panel models: a novel estimator. *Munich Personal RePEc Archive*, 1-26.

FAFALIOU, I., POLEMIS, M. L. (2013). Competitiveness of the Euro Zone Manufacturing: A Panel Data Analysis. *International Advances in Economic Research, 19*, 45-61.

GERNI, C. et al. (2013). The Analysis of Competitiveness and Economic Growth: A Case Study of Transition Countries. *International Business Research, 6*(5), 117-122.

GHERMAN, A. et al. (2013). Exchange rate volatility effects on export competitiveness: Romanian Case. *Theoretical and Applied Economics, 20*, 39-50.

HINLOOPEN, J., MARREWIJK, C. V. (2001). On the empirical distribution of the Balassa Index. *Review of World Economics, 137*(1), 1-35.

İLGÜN, M. F. (2016). Mali Sürdürülebilirlik: OECD Ülkelerine Yönelik Panel Veri Analizi. *Ataturk University Journal of Economics and Administrative Sciences 30*(1), 69-90.

KESKIN, H. İ., AKSOY, E. (2019). OECD ve Gelişmekte Olan Ülkelerde Gelir Artışı ve İşgücüne Katılım Arasındaki İlişki: Panel Eşbütünleşme Analizi. *Third Sector Social Economic Review, 54*(1), 1-20.

KORDALSKA, A., OLCZYK, M. (2016). Global Competitiveness and Economic Growth: A One-Way or Two-Way Relationship? *Quarterly Journal of Economics and Economic Policy, 11*(1), 121-142.

KOWAL, J., PALIWODA-PĘKOSZ, G. (2017). ICT for Global Competitiveness and Economic Growth in Emerging Economies: Economic, Cultural, and Social Innovations for Human Capital in Transition Economies. *Information Systems Management, 34*(4), 304-307.

MESSINA, W. A., BONNETT, E. T., Taylor, T. G. (2001). Cuba: A view of Revealed Export Advantage. *ASCE*, (102-104).

MOHAMAD, S. et al. (2009). Exchange Rates and Export Competitiveness in Selected ASEAN Economies. *International Business Research, 2*(2), 156-166.

MURATOĞLU, Y., MURATOĞLU, G. (2016). Determinants of Export Competitiveness: Evidence from OECD Manufacturing. *Economics and Political Economy, 3*(1), 111-118.

PESARAN, H., ULLAH, A., YAMAGATA, T. (2008). A Bias-Adjusted LM Test of Error Cross Section Independence. *Econometrics Journal, 11*(1), 105-127.

PESARAN, M. H. (2004). *General Diagnostic Tests for Cross Section Dependence in Panels.* Germany: IZA Discussion Paper.

PESARAN, M. H. (2007). A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence. *Journal of Applied Econometrics*, 265-312.

PESARAN, M. H., YAMAGATA, T. (2008). Testing Slope Homogeneity in Large Panels. *Journal of Econometrics, 142*, 50-93.

PILINKIENE, V. (2016). Trade Openness, Economic Growth and Competitiveness. The Case of the Central and Eastern European Countries. *Inzinerine Ekonomika-Engineering Economics, 27*(2), 185-194.

RAMIREZ, J. (2004). Impact of Free Trade Agreements (FTA) on Competitiveness:Identifying and Preparing for Threats and Opportunities. *International Business Strategies in Latin America-Sumaq Summit 04,* (12). Colombia.

STOJČIĆ, N. et al. (2012). The Competitiveness of Exports from Manufacturing Industries in Croatia and Slovenia to the EU-15 Market: A Dynamic Panel Analysis. *Croatian Economic Survey, 14*(1), 69-105.

SWAMY, P. A. (1970). Efficient Inference in a Random Coefficient Regression Model. *Econometrica Journal, 38*(2), 311-323.

ŞENER, S., SARIDOĞAN, E. (2011). The Effects Of Science-Technology-Innovation On Competitiveness And Economic Growth. *Procedia Social and Behavioral Sciences, 24*, 815-828.

TERZIĆ, L. (2017). The Role of Innovation in Fostering Competitiveness and Economic Growth: Evidence from Developing Economies. *Comparative Economic Research, 20*(4), 65-81.

WESTERLUND, J. (2005). New Simple Tests for Panel Cointegration. *Econometric Reviews* , 297-316.Zaidi, S. A., Zafar, M. W., & Shahbaz, M. (2019). Dynamic linkages between globalization,financial development andcarbon emissions: Evidence from Asia Pacific Economic Cooperation Countries. *Journal of Cleaner Production, 228*, 533-543.

ZHANG, K. H. (2015). What Drives Export Competitiveness? The Role of FDI in Chinese Manufacturing. *Contemporary Economic Policy, 33*(3), 499-512.