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The Influence of Incoming Tourists and Consumer Price Index on Tourism Receipts

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Abstract

The main purpose of this study is to examine the relationship between tourism revenues, the number of international tourists and the consumer price index in selected African countries with high income in tourism. For this purpose, the period between 1995-2019 was included in the analysis and examined. Pedroni's long-term cointegration coefficient estimation method was used as a method in the research. According to the results of the analysis, it was concluded that there is a statistically significant long-term effect between tourism revenues, the number of international tourists and the consumer price index, while the number of international tourists has a positive effect, and the consumer price index has a negative effect. In other words, it is estimated that the increase in the number of international tourists increases tourism revenues, while the increase in the consumer price index decreases tourism revenues.

Keywords: Tourist arrivals; tourism receipts; CPI, African countries; Peroni's long-term cointegration test

Introduction

The tourism sector has been developing day by day; enabling countries to earn income because of the expenditures made by people for various purposes in their travels and has become an important income item in the country's economy. As a result, countries are in competition with other countries in the field of tourism and affect each other, and they benefit or suffer from this interaction economically. The tourism sector, which plays an important role in globalization, has had a large share in the interaction between people and countries. As a result, countries are affected by each other economically, socially, and culturally (Gökmen & Çömlekçi, 2018; Akbulaev et al., 2020; Huseynli, 2022).

Tourism is a focus of interest for both developed and developing countries, as it is among the fastest growing sectors around the world. Tourism, as a major global income and job generator, drives many industries behind it. Countries with healthy and well-diversified economies cannot be expected to position their priority policies on tourism, even if their tourism potential is high. However, with its tourism potential, it can serve as an important source of income for any country of economic size (Biri, 2021; Akbulaev & Mirzayeva, 2020; Huseynli, 2022). Tourism revenues, as one of the important sources of economic development, contribute to economic diversity in most of the developing countries. Lejárraga and Walkenhorst (2013) revealed the links between tourism and the general economy, emphasizing the importance of tourism especially for developing countries. Foreign exchange revenues from tourism enable countries to finance their budget deficits and contribute to the solution of the unemployment problem. In addition, as Dritsakis and Athanasiadis (2000) stated, transportation, trade, construction, accommodation, food and beverage sectors and other service sectors have a strong connection and complementarity with tourism.

The rapid developments in the tourism sector in the world create competition among the countries that want to make the most of this area, and it is stated that the number of tourists worldwide reached 1.5 billion in 2009 (United Nations World Tourism Organisation [UNWTO], 2020). In recent years, international tourism has continued to develop rapidly and has become one of the largest and most profitable sectors of the world economy. Today, tourism accounts for 7 percent of the world's total investment, 5 percent of tax payments and 1/3 of world trade services. International tourism has a significant impact on key sectors of the economy such as transport, construction, trade, communications, agriculture, consumer goods, and acts as a catalyst for socio-economic development. Approximately 250 million people, or one in eight people worldwide, are employed in the tourism sector (Akbulaev & Aliyev, 2020; Sarkhanov & Tutar, 2021; Bayramli & Sarkhanov, 2021; Huseynli, 2022). Unfortunately, these positive indicators on tourism continue to follow a negative course with the COVID-19 pandemic. In this study, we investigated the relationship between the long-term cointegration test and the international tourism receipts, international tourist number and Consumer Price Index (CPI) in the sample of 7 African countries that import the most tourists. We think that the study will contribute to the literature in obtaining information about the tourism potential of the countries in question.

Literature review

When the relevant literature for this study is examined, it is seen that there has been a significant increase in studies on the relationship between tourism and economic growth in recent years. In this study, the relationship between the variables will be analyzed by researching the relationship between tourism revenues, the number of tourists coming to the country and the Consumer Price Index (CPI).

Hypothesis between the numbers of tourist arrivals with tourism receipts

In this study, the main reason for including the number of incoming tourists and tourism revenues in the analysis is to determine the sensitivity and ratio of the change in the number of inbound tourists to tourism revenues. It is estimated that there is a linear relationship between these two variables included in the model. In other words, the increase in the number of tourists coming to the country positively affects tourism revenues.VAR Analysis and Granger causality analysis were used in Erkan et al.'s (2013) study on monthly data for the 2005-2012 periods. According to the findings obtained from the econometric model, there is a significant relationship between the number of tourists and tourism revenues in Turkey, and according to the result of Granger causality analysis, there is a dual causality relationship between the number of tourists and tourism revenues. In other words, it is estimated that the increase in the number of tourists causes an increase in tourism revenues (Erkan et al., 2013). In the study conducted by Aydın (2016), the 20 countries that exported the most tourists to Turkey were examined with panel series analysis based on quarterly data for the years 2002-2015. As a result of the analysis, it has been estimated that there is a positive and significant relationship between the number of tourists coming to the country and tourist revenues.

Hypothesis between consumer price index with tourism receipts

In this study, the main reason for including the Consumer Price Index and tourism revenues in the analysis is to determine the sensitivity of the change in the Consumer Price Index to the number of tourists coming to the country and tourism revenues. It is estimated that there is an inverse relationship between these two variables included in the model. In other words, since increases in product prices and cost of living will negatively affect tourists coming to the country, price increases negatively affect tourism revenues. In the study of Karadağ (2021), the relationship between tourism revenues and the Consumer Price Index in the Turkish economy was examined using the Toda-Yamamoto Causality Test for the period 2003:01-2020:12. As a result of the test, it was concluded that there is a causal relationship between the Consumer Price Index and tourism revenues for the Turkish economy and that the change in the Consumer Price Index affects tourism revenues. Dinç and Rüştü (2017) investigated the impact of the Consumer Price Index on tourism revenues based on the annual data covering the 1985-2015 period of Turkey using time series regression analysis. As a result of the study, no relationship was found between the Consumer Price Index and tourism revenues in the study, and it was estimated that there was a negative relationship between the Consumer Price Index variable and tourism revenues, as expected. Yildirim et al. (2017) conducted a Johansen cointegration test using monthly data between 2005-2015 to determine the relationship between inflation and tourism revenues in his study on Turkey. As a result of the analysis, while there is a relationship between inflation and tourism revenues in the short run, there is no relationship in the long run, and it is seen that inflation affects tourism revenues negatively. In the study conducted by Özcan (2015), DOLS and FMOLS tests, which are panel data analysis methods, were used to determine the relationship between international tourism income and the Consumer Price Index, based on the data of the top 20 countries that send the most tourists to Turkey between 1995 and 2011. As a result of the analysis, the relationship between the Consumer Price Index and international tourism income was significant and negative. In other words, an increase in the Consumer Price Index reduces international tourism revenue.

Methods

Data

The model was established in the study. It was investigated the impact of international tourism, number of arrivals and Consumer Price Index (CPI) on international tourism, receipts. To analyze of the data collected from the sources shown in Table 1, the Panel Time Series Analysis was performed with the STATA 2017 and E-Views package program, which is a statistical and econometric program for economic sciences. In the study some data was not available for some of the years or countries, so the dataset was chosen for which all the data for all the relevant years and countries were available and it was then tested to confirm or reject the validity of the hypothesis. Thus, it was chosen the dependent and independent variable data of 7 African Countries between the period 1995-2019 and all data used in the analysis has been converted into logarithmic form. Table 1 below shows the main sources from which the data were obtained.

Table 1. Independent and dependent variables by data source

Symbol	Definition	Unit	Source
TR	International tourism receipts	Million (current US$)	The World Bank, www.data.worldbank.org
TN	The number of international tourist arrivals	Million people	
CPI	Consumer Price Index (CPI)	(2010 = 100) (%)	
Dates and Countries using in the Analysis			
Name of Countries			Dates
Egypt. Mauritius, Morocco, South Africa, Tanzania, Togo, Tunisia, (Total 7 Countries)			Between 1995 – 2019 (Total 25 years)

In our study, a balanced panel data study was established with 175 observations for all countries and series and descriptive statistic values of dependent and independent variables data using in the study, Table 2 below was shown.

Table 2: Descriptive statistics of variables used in the model

Variable	Observations	Mean	Std. dev.	Min	Max
TR	175	3716.499	3619.523	10	14256
TN	175	4.778823	4.401517	0.053	15.121
CPI	175	93.74962	39.44009	28.561	288.573

Source: Compiled by Authors

Model

In this research, the model was established to investigate the individual and whole effect of the factors included in the analysis on international tourism receipts. When N units and T number of each unit are considered together, it is a multi-panel data model. To analysis what factors identify the international tourism receipts (Medvedeva, 2016). The general form of multiple linear regression is applied:

$Y_{it} = b_{0it} + b_{1it}X_{1it} + b_{2it}X_{2it} + \cdots \ldots \ldots + b_{kit}X_{kit} + u_{it}$ $\quad i = 1, \ldots, N; t = 1, \ldots, N$ (1)

or briefly

$Y_{it} = b_{oit} + \sum_{k-1}^{K} b_{kit}X_{kit} + u_{it}$ $\quad i = 1, \ldots, N; t = 1, \ldots, N$ (2)

where Y_{it} and X_{kit} are the dependent and independent variables for each i; b_{oit} and u_{it} are fixed effects and error term, respectively. All the data of a dependent and all independent variables, used were converted into a logarithmic form and shown separately for the model (Grossman & Petrov, 2017). The model investigates the factors influencing international tourism receipts and is formulated as follows:

$logTR_{it} = b_0 + \text{b}_1 logTN_{it} + \text{b}_2 logCP\dot{I}_{it} + u_{it}$ (3)

Where b_1, and b_2 are the coefficients of international tourism receipts CPI, respectively

$logTR_{it}$: is the logarithm form of international tourism receipts

$logTN_{it}$ is the logarithm form of the international tourists number

$logCP\dot{I}_{it}$ is the logarithm form of Consumer Price Index (CPI)

u_{it} is an error term

Cross-sectional dependence tests

Cross-Sectional Dependence test recommends that such as a result of the rapidly increasing economic cooperation and globalization of the world countries, the economic integration between countries or unions is also increasing. Increasing economic integration between countries has made countries economically dependent on each other. It is foreseen that it is inevitable that economic shocks and mobility in a country or unit will affect other countries or units at different levels (Demez, 2021). When working in panel data models, the cross-sectional dependence between countries or units should be considered. If the cross-sectional dependence is not considered, serious erroneous parameters may occur in the estimation results (Chudic & Pesaran, 2013). Therefore, it is important to test both as variables and as a model in order to avoid erroneous parameters and to determine whether there is a cross-sectional dependence between the units (Uğur, 2021). For the cross-sectional dependence between units not to cause biased results in panel data analysis, first-generation tests in case of cross-sectional independence and second-generation tests in case of cross-sectional dependence tests and estimators should be used (Aydın & Turan, 2020). There are a number of tests in the literature to identify cross-sectional dependence. In this study, Breusch-Pagan (1980) LM_{BP}, Pesaran (2004) scaled LM and Pesaran (2004) CD tests were conducted to determine cross-sectional dependence.

Breusch and Pagan (1980) test

It is a Lagrange Multiplier test based on the correlation coefficients of the residuals at T → ∞ cases, while N is constant in the Breusch & Pagan (1980) test. LM_{BP} test based on the correlation between errors bρij and the test statistics were calculated as follows model (Breusch & Pagan, 1980).

$$LM_{BP} = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^2 \qquad (4)$$

(X^2; $\frac{N(N-1)}{2}$) at Chi-square asymptotic distribution and degrees of freedom in case of (T> N).

Where, the $\hat{p}_{ij}^2$ indicates the sample predictived value of the cross-section correlation coefficients of the equation between the residuals. In Breusch & Pagan (1980) LM_{BP} test, the null hypothesis of no dependence in cross-sections is tested against unit hypothesis of dependence between two cross sections.

Pesaran scaled LM test

Pesaran (2004) criticized the fact that the power of the LM_{BP} test decreases as the number of cross-section units (N) increases, and even the fact that the test cannot be used in the case of N→∞. Thus, he recommended by overcoming these problems thus, the following scaled version of CD_{LM1} that for testing the hypothesis of cross dependence even for N and T large:

$$CD_{LM1} = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(T\,\hat{\rho}_{ij}^2 - 1) \quad (5)$$

According to Pesaran (2004) CD_{LM1} test, it is assumed that there is no cross-sectional dependence when $T\to\infty$ *ve* $N\to\infty$. However, in cases where N>T, the CD_{LM1} test shows significant distortions and the deviations increase as N gets larger (Pesaran, 2004).

Pesaran CD test

To overcome the problems of significant distortions and the increase in deviations as N gets larger, Pesaran (2004) developed the test statistics consists of the sum of the correlation coefficients between cross-section residuals. According to Pesaran (2004) CD_{LM2} test, it is also assumed that there is no cross-sectional dependence when $T\to\infty$ *ve* $N\to\infty$ and the test statistic should be used in case the cross-sectional size (N) is larger than the time dimension (T) is (N >T). Pesaran CD test statistic is calculated with the following formula:

$$CD_{LM2} = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^2\right) \quad (6)$$

This test statistic shows a standard normal distribution under the H_0 hypothesis, which shows that there is no relationship between cross-sections (Pesaran, 2004; Güloğlu & İvrendi, 2010). The null and alternative hypotheses used for the cross-sectional dependence test are as follows:

H_0: Cov (u_{it}; u_{ij})=0, *There is no cross-sectional dependence.*

Ha: Cov (u_{it}; u_{ij})≠0, There is a cross-sectional dependence.

Finally, p-values are calculated to decide about the null hypothesis (Aydin, 2019). According to the test results, if the calculated probability values are bigger than the significance values, the null hypothesis cannot be rejected; this means that there is no cross-sectional dependence between countries. In this case, the analysis should be continued with first generation panel unit root tests. In contrast, if the calculated probability values are smaller than the significance values, the null hypothesis rejected, this means that there is cross-sectional dependence between countries. In this case, the analysis should be continued with second generation panel unit root tests (Baltagi, 2008).

Homogeneity tests

Before performing a cointegration test, it is necessary to learn whether the slope coefficient present in the cointegration equation is homogeneous or heterogeneous to reach reliable findings from this analysis. For determining homogeneity or heterogeneity, slope homogeneity tests recommended by Pesaran & Yamagata (2008) based on DELTA tests, as well as the Swamy S test (2071) were used.

Swamy S homogeneity test

To test the Random Coefficients model, the difference between the unit-specific least squares estimator and the weighted mean matrices of the within-group estimator, which ignores the panel structure of the data, can be looked at. Swamy test statistics formula is shown below (Swamy, 1970):

$$\hat{S} = x^2_{k(N-1)} = \sum_{i=1}^{N}(\hat{\beta}_i - \bar{\beta}^*)' \frac{X_i' M_t X_i}{\hat{\delta}_i^2}(\hat{\beta}_i - \bar{\beta}^*) \qquad (7)$$

Where, β_i' is OLS estimators from regressions by units, $\bar{\beta}^*$ is weighted WE estimator and $\frac{X_i' M_t X_i}{\hat{\delta}_i^2}$ is difference between the variances of the weighted WE estimator and OLS estimator. The test statistic has an X^2distribution with N(N-1) degrees of freedom (Tatoğlu, 2018). If there is no statistically significant difference between the OLS estimators and the WE mean matrix it means that the parameters are homogeneous. In contrast, if there is statistically significant difference between the OLS estimators and the WE mean matrix it means that the parameters are heterogeneous (Sevinç, 2020).

Slope homogeneity tests

Slope Homogeneity Tests based on the DELTA tests are an improved version of the Swamy test for panel data with large N and T by Pesaran & Yamagata (2008). Pesaran & Yamagata (2008) developed two different test as large samples and small samples statistics to test hypotheses:

For large samples: $\hat{\Delta} = \sqrt{N}\,(\frac{N^{-1}\,\tilde{S} - k}{\sqrt{2k}})$ (8)

In the case of normally distributed errors the mean-variance bias adjusted was expressed the following way:

For small samples: $\hat{\Delta}_{adj} = \sqrt{N}\,(\frac{N^{-1}\,\tilde{S} - E(\tilde{z}_{\hat{it}})}{\sqrt{var(\tilde{z}_{\hat{it}})}})$ (9)

Where, N is cross section number, S is Swamy test statistic, $E(\tilde{z}_{\hat{i}\hat{t}}) - k$ is number of explanatory variables and $Var(\tilde{z}_{\hat{i}\hat{t}})$=2k/(T-k-1) shows to the standard error (Keskin & Aksoy, 2019). The null and alternative hypotheses used for the Slope Homogeneity test are as follows:

H_0: slope coefficients are homogenous
H_a: slope coefficients are heterogeneous

Finally, p-values are calculated to decide about the null hypothesis. According to the test results, if the calculated probability values are bigger than the significance values, the null hypothesis cannot be rejected; this means that the models are homogeneous. In contrast, if the calculated probability values are smaller than the significance values, the null hypothesis rejected, this means that the models are heterogeneous (Govdeli, 2019).

Panel unit root tests
In panel unit root analysis, different unit root tests have been developed depending on whether there is a cross-sectional dependence or not. In the case of no cross-section dependence, first-generation panel unit root tests and in case of cross-section dependence, second-generation panel unit root tests are used. According to the results of Breusch & Pagan (1980) LM, Pesaran (2004) scaled LM and Pesaran (2004) CD's cross-section dependence tests shown in Table 3, Because of The calculated probability values are smaller than the significance values at 1%, 5%, and 10% the null hypothesis were rejected and there was cross-sectional dependence between countries. Thus, in the study it will be used second generation panel unit root tests (Tatoğlu, 2020). In addition, the model was estimated to be heterogeneous according to the homogeneity test results. Taking these into account, the stability of the variables included in the model will be analyzed with the CIPS test, which is one of the 2nd generation heterogeneous Panel unit root tests.

CIPS panel unit root tests
Pesaran CADF panel unit root tests is an expanded form of ADF regression with first differences of individual series and cross-sectional means of lag levels. CIPS and CADF tests working under the assumption of cross-section dependence can be used in cases where both $T>N$ and $N>T$. Accordingly, the CADF regression can be written as in equation (10) below (Pesaran, 2007).

$$\Delta Y_{it} = a_i + b_i Y_{i,t-1} + c_i \overline{Y}_{t-1} + d_i \Delta \overline{Y}_t + \varepsilon_{i,t} \quad (10)$$

where, ΔY_{it} is Critical values of the individual CADF test, $Y_{i,t-1}$, $\overline{Y}_{t-1}$ and $\Delta\overline{Y}_t$ is non-constant, constant and constant trend values based on Least Squares regression, respectively and $\varepsilon_{i,t}$ is the error term. CIPS test statistics are based on cross-sectional augmented ADF (CADF) panel unit root test, which is calculated for each section unit. After calculating the CADF test statistic as given in the first equation, the CIPS value is calculated as follows (Shahbaz et al., 2016).

$$CIPS = N^{-1} \sum_{i-1}^{N} CADF_i \quad (11)$$

The null and alternative hypotheses for the CADF and CIPS panel unit root tests demonstrate the unit root and stationarity, respectively. The calculated values are compared with the critical values created by (CIPS) and Pesaran based on Monte Carlo simulations. According to the test results, if the calculated values are bigger than the critical values, the null hypothesis cannot be rejected; this means that there is the unit root. In contrast, if the calculated values are smaller than the critical values, the null hypothesis rejected, this means that there is stationarity (Mercan et al., 2015).

GUW panel cointegration test

The next step after determining the stationarity of the variables subject to the analysis is to investigate the existence of a long-term relationship between the variables (Köksel & Yılmaz, 2021). In this study, Gengebach, Urbain and Westerlund Panel Co-integration test, which is a second-generation Panel Cointegration test that allows heterogeneity and cross-sectional dependence and considers lag lengths, will be applied (Tatoğlu, 2020). Gengenbach, Urbain and Westerlund Panel Cointegration test, which is based on error correction, is calculated based on the model below.

$\Delta Y_i = d\delta_{y.x_i} + a_{y_i} y_{i,-1} + \omega_{i,-1} y_i + \sigma_i y_i + \varepsilon_{y.x_i} = a_{y_i} y_{i,-1} + g_i^d \lambda_i + \varepsilon_{y.x_i}$ (12)

In the first stage of the test, as seen in Equation 13, the OLS estimation of the model is made for each unit and the $H_0: \hat{a}_{y_i} = 0$ hypothesis is tested with the help of the t test. The variance and the OLS estimator of a_{y_i} are as follows

OLS estimator of a_{y_i} $\hat{a}_{y_i} = \frac{y_{i,-1} M_{g_i^d} \Delta y_i}{y_{i,-1} M_{g_i^d} \Delta y_{i,-1}}$ (13)

And variance of of a_{y_i} $\sigma^2_{a_{y_i}} = \frac{\sigma^2_{\hat{a}_{y,x_i,}}}{y'_{i,-1} M_{g_i^d} y_{i,-1}}$ (14)

Thus, $t_{c_i} = t_{a_{y_i}} = \frac{\hat{a}_{y_i}}{\sigma_{\hat{a}_{y_i}}}$ (15)

The null hypothesis and alternative hypothesis of GUW Panel Cointegration test for the calculated panel statistics can be expressed as follows.

$H_0: p > 0{,}1$ *there is no cointegrated relationship*
$H_1: p < 0{,}1$ *There is a cointegrated relationship*

The critical values for the 1%, 5% and 10% significance level of the GUW test are, 1,96 and respectively (Gengenbach et al., 2016).

The long-term Pedroni cointegration test

If a long-term relationship (cointegration) is detected, panel cointegration estimators are used to determine the direction and degree of this relationship. Therefore, in this study, the Mean Group Dynamic Least Squares (DOLSMG) Estimator, which was brought to the literature by Pedroni (2001), and the Second-generation long-run Pedroni cointegration test, which allows heterogeneity and cross-section dependence, were used. The DOLSMG estimator is based on the model shown in Equation 16 (Pedroni, 2001);

$y_{i,t} = \mu + \beta X_{i,t} + u_{i,t}$ (16)

The model given in Equation 16 is estimated by dynamic least squares (DOLS) method by adding antecedent values and delays for each section. The values calculated for each section are then combined with the Pesaran and Smith MG approach to obtain the whole panel value, as shown in Equation 17 (Kiliç et al., 2021):

$\hat{\beta}_{DOLSMG} = N^{-1}\left[\sum_{i=1}^{N}\left(\sum_{t=1}^{T}(Z_{i,t} Z'_{i,t})\right)^{-1}\right]\left(\sum_{t=1}^{T}\left(Z_{i,t}\, \bar{Y}_{i,t}\right)\right)$ (17)

Where the explanatory vector $Z_{i,t}$ is $Z_{i,t} = (X_{i,t}, \bar{X}_i, \Delta X_{i,t-k,} \ldots \ldots \Delta X_{i,t+k,})$ for $\bar{Y}_{i,t} = Y_{i,t} - \bar{Y}_i$. Therefore, the DOLSMG estimator is obtained by taking the average of the DOLS estimators obtained for each i unit. The $\hat{\beta}_{DOLSMG} = N^{-1} \sum_{i=1}^{N} \hat{\beta}_{DOLS,i}$ and t statistics are averaged and converted to $t_{\hat{\beta}_{\text{DOLSMG}}} = N^{-1} \sum_{t-1}^{T} t_{\hat{\beta}_{\text{DOLS,i}}}$ (Alev & Erdemli, 2019).

Thus, $$(t_{\hat{\beta}_{\text{DOLS,i}}} = (\hat{\beta}_{\text{DOLS,i}} - \beta)(\sigma_i^{-2} \sum_{t-1}^{T} (X_{i,t} - \bar{X}_i)^2)^{1/2} \quad (18)$$

The new equation has the form of the pattern shown in Equation 18 (Tatoğlu, 2017).

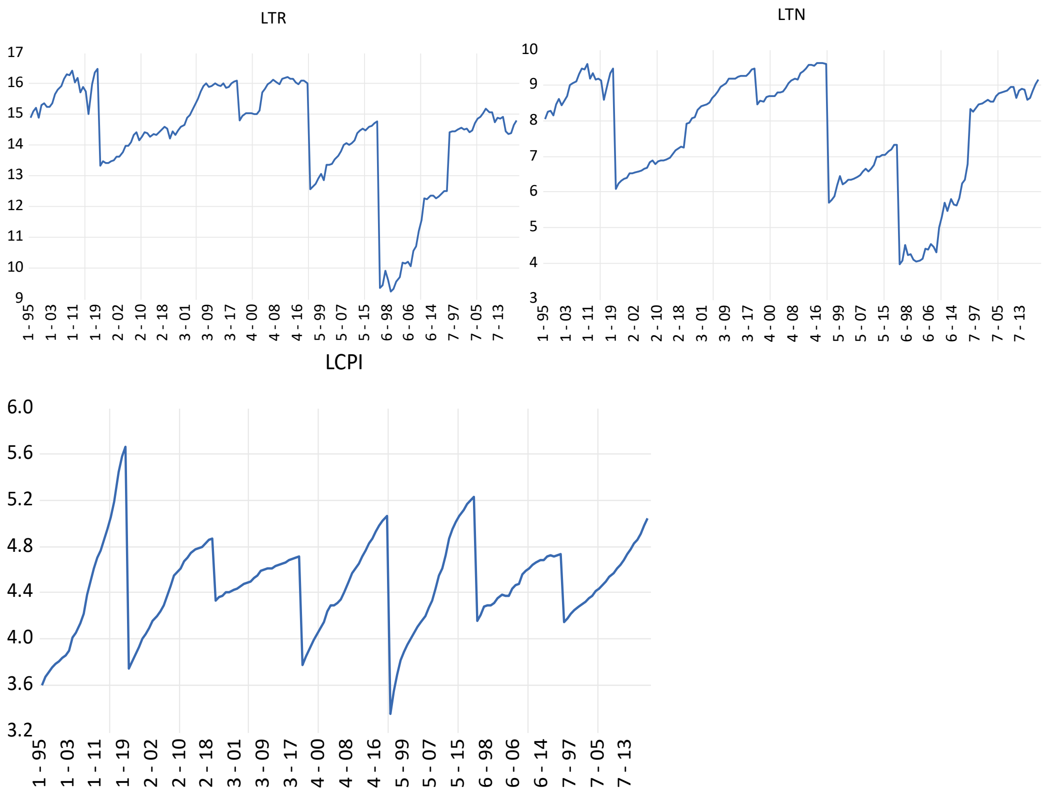
Results

In the globalizing world, as a result of cooperation and integration between countries, macroeconomic variables of countries become interdependent and economic shocks in one country directly or indirectly affect other countries. Therefore, Breusch & Pagan (1980) LM, Pesaran (2004) scaled LM and Pesaran (2004) CD tests were used to determine whether there is a cross-sectional dependence among the countries selected as a unit, both in terms of variables and as a model. In addition, the Swamy S Homogeneity and Slope Homogeneity Tests were used to determine whether this model included in the analysis was homogeneous or heterogeneous. The results of the cross-section dependency tests in terms of both variables and the model, as well as the results of the homogeneity tests between the variables in the model are presented in Table 3 below.

Table 3. Cross-section dependence and slope homogeneity tests results

Cross-Sectional Dependence Tests by Variables			
Variables	**Breusch-Pagan LM**	**Pesaran scaled LM**	**Pesaran CD**
TR	332.5713*	48.0765*	17.6937*
TN	386.8493*	56.4518*	19.5293*
CPI	503.9345*	74.5184*	22.4456*
Cross-Sectional Dependence Tests by Models			
Model 1	135.1980*	17.6211*	6.9238*
Homogeneity Tests by Models			
	DELTA Test		Swamy S Test
	$\hat{\Delta}$	$\hat{\Delta}_{adj.}$	chi2(18)
Model 1	10.185*	11.112*	1839.00*
***indicate the rejection of the null hypothesis at the 1%, significance level.**			

According to the results of the three cross-section dependency tests performed for both the model and the variables in Table 3, the calculated probability values are smaller than the table values at the significance level of 99%, 95% and 90%. For this reason, the null hypothesis was rejected, and it was estimated that there was a cross-sectional dependence between countries in terms of both variables and models. Based on the estimation results of cross-sectional dependency tests, the model should be continued to analyze with second generation tests. Tested at 1%, 5%, and 10% of the significance values for this model, Delta, Delta adj. According to the results of the test and Swamy Homogeneity tests, the calculated probability values are smaller than the table significance values, so the null hypothesis was rejected, and this model was estimated to be heterogeneous. That is, it is concluded that our model is a second-generation heterogeneous model.



Graphic 1

The graph results were evaluated to determine whether this model is a stable trend. According to the results of the graphic analysis shown in Graphic 1, it was determined that the model did not contain any trends and was stable. Considering the results of cross-sectional dependency tests, heterogeneity tests and graphic analysis, the CIPS test, which is one of the second-generation heterogeneous panel unit root tests without trend (constant), was tested to see if the variables were stationary at the level or at the first differences. The results of the fixed CIPS unit root test is shown in table 4 below.

Table 4: CIPS panel unit root test results

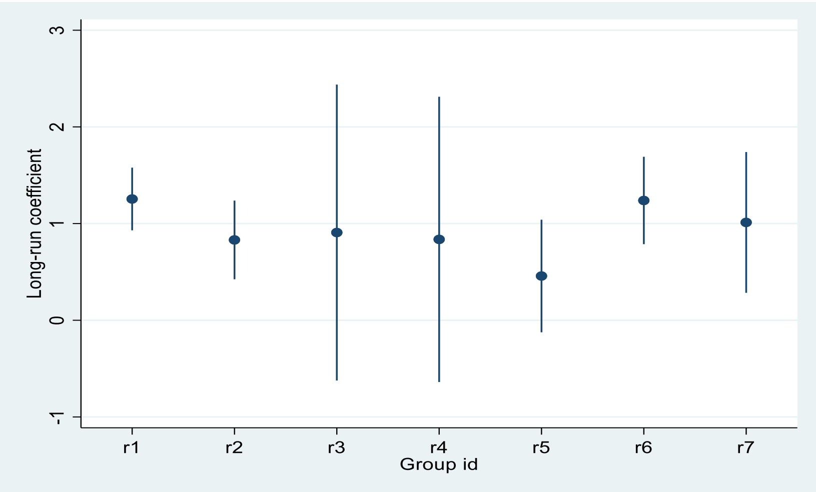
Variables	**Level**		**First Differences**
TR	-1.911		-4.795*
TN	-1.769		-4.712*
CPI	-0.560		-3.124*
Critical Table values	-2.21	-2.33	-2.57
*** indicate the rejection of the null hypothesis at the 1% significance level.**			

According to the results of the CIPS panel unit root test shown in Table 4, all variables contain unit root at level and become stationary at the 99% confidence level at first differences. In other words, the series are stationary at first (1) difference. According to the panel unit root test result, GUW was developed by Gengenbach, Urbain and Westerlund (GUW), which is one of the second-generation heterogeneous tests, considering the cross-sectional dependence and heterogeneous parameters, which allows determining whether this model includes long-term cointegration when all variables are stationary in the first differences. It was decided to apply the panel cointegration test (Dural & Sarıoğlu, 2020). The results of the GUW panel cointegration test are shown in table 5 below.

Table 5: GUW panel cointegration test results

Panel EC-test	T-bar	P-val*
$Y_{(t-1)}$	-3.229	<=0.05

According to the GUW panel cointegration test results shown in Table 5, when the $Y_{(t-1)}$ significance for the Panel cointegration test is examined, it is seen that the null hypothesis was rejected, and the calculated coefficient was statistically significant at the 95% confidence level. In other words, it is understood that there is a long-term cointegration relationship between international tourism, the number of visitors, the Consumer Price Index and international tourism revenues. In addition, the ECT (-1) Graphic of the long-term parameters of the GUW forecasting model by units is shown in Graphic 2.



Graphic 2

In the model, the long-term Pedroni estimator, which is one of the second-generation heterogeneous tests, was used, taking into account the results of the GUW panel cointegration test, which predicts a long-term cointegration relationship, the results of the cross-section dependency tests and the homogeneity tests. This test can be estimated by taking the difference from the cross-sectional averages of the variables and using the DOLS estimator for the transformed model units and the Pedronin (2001) DOLSMG estimator for the whole panel. Table 6 below shows the long-run Pedroni cointegration estimation results by country and model.

Table 6: Pedroni estimation test results

Countries		TN		CPI	
		Beta	t-stat	Beta	t-stat
1	Egypt	0.2934	1.439	-0.811	-1.748***
2	Mauritius	0.832	7.748*	-0.579	-3.842*
3	Morocco	1.468	5.156*	0.147	1.271
4	South Africa	-0.656	-0.7723	-2.828	-2.129**
5	Tanzania	0.48	2.857*	0.574	10.58*
6	Togo	1.259	3.045*	-1.691	-1.835***
7	Tunisia	0.966	2.334**	2.013	2.205**
Model		0.663	8.242*	-0.454	1.701***
*, **, *** indicate the rejection of the null hypothesis at the 1% (2.60), 5% (1.96), 10% (1.65) significance level, respectively					

According to the result of Table 6, the long-term relationship between the number of international tourists, the Consumer Price Index and international tourism revenues is estimated by the DOLSMG method. The long-term parameters estimated between the international tourism revenues, the number of international tourists and the Consumer Price Index were 0.66 and (-0.45), respectively. As a model the long-term parameters were statistically significant at the 99% confidence level and the Consumer Price Index at the 90% confidence level. According to DOLSMG results, the number of international tourists and the Consumer Price Index affect international tourism revenues in the long term. While the effect of other variables is constant, a 1% increase in the number of international tourists increases international tourism revenues by 0.66%, while a 1% increase in the Consumer Price Index decreases international tourism revenues by 0.45%.

Conclusion

When examining in terms of the model, it was seen that the effect of the change in the number of international tourists on international tourism revenues was positive and significant. The expected hypothesis results were the same as the results of previous studies by Erkan et al. (2013) and Aydın (2016). It was concluded that the effect of the change in the Consumer Price Index on International tourism revenues was significant and negative. The expected hypothesis between the Consumer Price Index and International tourism revenues was the same with the analysis results estimated by Karadağ (2021), Dinç & Rüştü (2017), Yıldırım et al. (2017), Özcan (2015). When the studies in the literature were examined, it was seen that the results between both independent variables and dependent variables were similar.

According to the DOLS estimation results for all units, the effect of the change in the number of international tourists on international tourism revenues was statistically insignificant in Egypt and South Africa. From the other countries, Tunis was at the 95% security level and the other 4 countries were at the 99% security level. Mauritius, Morocco, Tanzania, Togo, and Tunisia, which are significant in terms of countries, increase the number of international tourists by 1% in the long term, increasing the international tourism revenues by 0.832%, 1.468%, 0.480%, 1.259% and 0.966%, respectively.

According to the DOLS estimation results for all units, the effect of the change in the Consumer Price Index on International tourism revenues was statistically significant in other countries except Morocco. In the long run, which is significant for countries, Egypt, Mauritius, South Africa, and Togo, while the effects of other variables are constant, the 1% increase in the number of international tourists decreased the international tourism revenues by 0.811%, 0.579%, 2.828%, 1.691% and 0.454%, respectively. Tunisia, on the other hand, increased by 0.574% and 2.013%, respectively.

However, the study has important implications for the economic policy makers of the 7 countries with the highest tourism income in Africa. The regional cooperation of these countries should be a priority along with the development of long-term strategies for sustainable tourism to have a further positive impact on economic development. This study will be a resource for future researchers to investigate the lack of studies using dependent and independent variables simultaneously and especially on African countries.

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