Volume 37, Issue 1

Does tourism development lead positive or negative impact on economic growth and environment in BRICS countries? A panel data analysis

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Abstract

Tourism has been a new dimension in economics of international trade in the recent years for the developing countries. It contributes to the economic growth by contribution to the foreign exchange for many nations. The present study is an attempt to examine the relationship between tourism revenue, economic growth and its implications for the environment. Panel data approach for the period of 1995-2013 has been applied to the BRICS countries to investigate the interrelationship among variable using ARDL co-integration model. The result validates 'tourism led-growth hypothesis' for BRICS countries which implies that the growth of tourism in BRICS nations has a positive impact on economic growth. The study further reveals that the growth in tourism leads to both positive and negative effects on the economy over time. The study used renamed Environmental Kuznets Curve to reveal that not all environmental controlling measures improve but only pollution controlling measures helps improving income. The study concludes that growth in tourism generates negative externalities in the form of pollution, which needs to be addressed by the government to enhance sustainability in economic growth and development in BRICS nations.

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1. Introduction

The tourism has added a new dimension in economics of international trade. Nowadays, it contributes to foreign earnings for many countries. Tourism leads economic, social, cultural and linguistic development of many countries. Tourism generates direct and indirect employment, increases standard of living, welfare of public and production of goods. Tourism is the harbinger for the economic growth and development for many developing countries. Tourism helps the country to solve many macroeconomic problems like unemployment, infrastructure and deficits of the country by increasing foreign exchange earnings. Tourism has created a spillover effect from one sector to another by the transformation of income. It was the year 1980s when large issues such as global warming biodiversity loss and ozone depletion became the focus of debate towards the environment as a medium of absorbing the waste Neumayer, (2003: 47). As the Brentwood report 1987 emphasizes sustainable development leads economic growth particularly for the developing countries. The Kuznets curve is being named in (1995) which puts forward that economic inequality will increase at the early stages of development and after the threshold limit it decrease in the later stages of economic growth. In 1990s it was Grossman and Krueger's (1991) who introduced the EKC in his work potential environmental impacts of NAFTA. Shafik & Bandyopadhyay World Bank Report (1992), Cole & Neumayer (2005), Stern (2003; 2004) Perman & Stern (2003), seldom & Song (1994) and Cole (2003) which puts forward the relationship between economic growth and environment with the help of Environmental Kuznets Curve (EKC). Whereas hypothesized relationship has been made on the basis of Environmental Kuznets inverted U Curve. The relationship between economic growth and environmental quality can be positive or negative depending upon the development of the area. The higher income groups can affords better infrastructure and clean environment, but the low level income groups are capable of damaging environment and that relationship is given by EKC in Figure 1.

Figure 1: The environmental Kuznets curve: a development-environment relationship
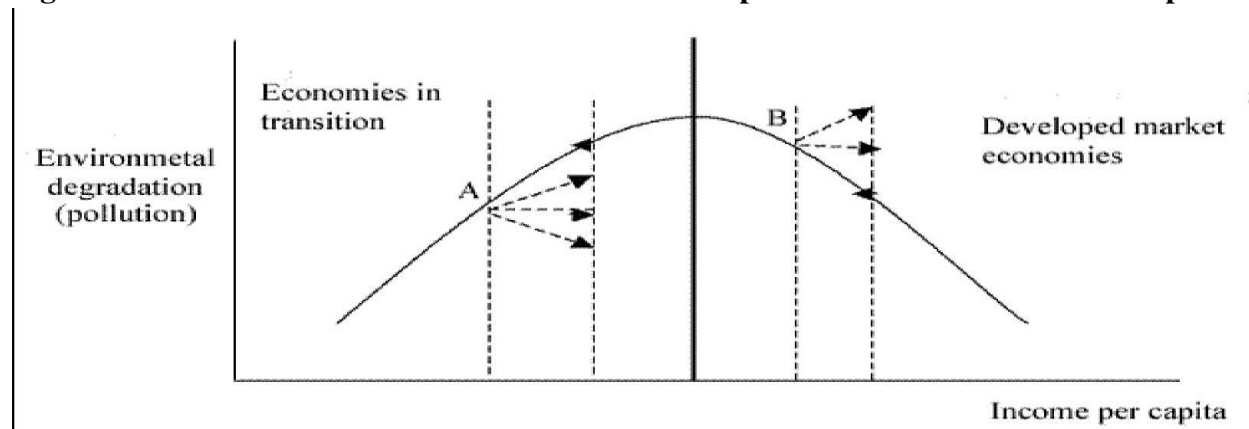
Source: *Theodore Panayotou in Economic Survey of Europe, 2003 No. 2*

Tourism is a driving force, which can stimulate the economic growth by an income increase in as export-led growth hypothesis with the help of enhancing efficiency between local firms and corresponding international tourists and also by exploiting the economies of scale in domestic firms Bhagwati and Srinivasan (1979), Helpman and Krugman (1985) and Krueger (1980). Tourism and environment have a complex and interdependent relationship, which depends upon the stages of the growth of the country which encourages conservation of natural resources in the form of national parks and reserves. It contributes to the development of the area in the form of infrastructure, preserving forestry, direct and indirect employment. So, policy makers can help a country to overcome with regional inequalities and leads balanced growth.

C-O Oh, (2005) that it does not only create employment opportunities but also increases foreign exchange income which stimulates the growth of tourism industry and with this phenomenon it triggers overall economic growth. However tourism development has become an important target for most governments. The growth of the tourism industry will boost country's economic growth with this magnitude of contribution of tourism in growth is called as tourism led growth hypothesis. It has been seen, the countries which is moving towards a faster economic growth, pollutes more environment due to the higher release in carbon emission in developing countries.

Ozturk, (2010) Suggested and tests the tourism-led hypothesis under four different headings. First, growth hypothesis argues it is the tourism which boosts economic growth directly and indirectly. The growth hypothesis is unidirectional causality from tourism to economic growth. We need to subsidize tourism to enhance economic growth. Second, the conservation hypothesis suggests it is the economic growth which stimulates tourism growth. The validity of this hypothesis has been proven when the causality is from economic growth to tourism. This means transferring subsidies from tourism sector to other sector will not worsen the economic growth. Third, the feedback hypothesis indicates a common association between economic growth and tourism. If there is a bi-directional relationship between tourism and economic growth, in this case tourism conservation policies will effect economic growth and vice-versa. Fourth, another hypothesis is called neutrality hypothesis which shows tourism has no effect on economic growth. The non-appearance of causality between tourism and economic growth gives conformation for the existence of the neutrality hypothesis. With this phenomenon we employ two different indicators (tourism revenue of all countries and GDP as a proxy of economic growth) of the countries.

The paper is an attempt in examining the role of emerging countries which is being instrument in bringing about transformational changes in BRICS countries. The main focus of the paper is to verify the relationship between economic growth, tourism revenue and environment which has not been studied for BRICS countries. This paper will give you the light on future prospects of fast growing nations (BRICS Countries) in which we try to examine the tourism growth nexus using ARDL and Granger causality approach.

The principal aim of the paper is to find out the relationship between economic growth and environment, with the help of ARDL Bound Testing and Quadratic equation model. However,

these model will support Environmental Kuznets curve, which validates the evidence that developmental policies have a potential of being environmental benign over the long run (at high income) but they are also capable of damaging environment in short and medium term (in low and medium income).

The paper has been organized as follows. Section 2 deals with the literature framework of the study. Section 3 provides the data and research methodology used in this study. Section 4 Present the empirical results from the study. Final Section 5 provides the conclusion of the paper.

2. Literature Review

The relationship between tourism earnings and economic growth has been fairly good enough when it comes to investigate. The role of tourism has become important for the growth of the economy provides direct as well as indirect employment and foreign exchange earnings. The strong causality between economics growth and tourism revenue has also been accepted by WTO and by World Travel and Tourism Council (WTTC).

Khalil, Khan and Waliullah (2007) made an effort to find out the relationship between tourism revenue and (GDP) proxy of economic growth in Pakistan. The study finds the evidence of both short run and long bidirectional relationship between tourism and economic growth by using granger causality and co-integration. The results conclude that economic expansion is vital important for the growth of tourism in the country.

Bilal, Ahmet and Famil (2010) verify the tourism led growth hypothesis for Turkey by using quarterly data. They used gross domestic product, real total exchange rate, real total expenditure and international tourism arrivals to find out the relationship among the variables. The results of ARDL and ECM support unidirectional long run relationship between international tourism to real exchange rate. The findings suggest that tourism is the driving factor for economic growth in turkey and which in turn help us to reduce current account deficit of the country.

Balaguer and Cantavella (2010) stated that tourism as a forceful factor for the economic growth of the Spain. They used co-integration and Granger causality to find the existence of tourism-led growth hypothesis. The findings made it clear that there is a long run firm relationship between economic growth and tourism augmentation and causality test yields positive confirmation in support of tourism-led growth hypothesis for Spanish economy.

According to Assadzadeh and Najafi (2012) tourism is the robust for the growth of developing countries. Author made deliberative efforts to find the relationship between economic growth and tourism for Iran. They used Granger causality and Hsian test to find out the relationship between the variables. The study reaffirms the bidirectional long and short run relationship between tourism and GDP of the country. They find positive relationship but insignificant because the income received from tourism does not significantly affect the GDP.

Suleiman and Masoud (2014) used ARDL co-integration and granger causality to identify the direction of relationship between trade, tourism, infrastructure and economic growth in Malaysia. The results provide evidences of long and short run relationship among the variables. The

causality shows unidirectional relationship from tourism to economic growth, tourism to infrastructure and tourism to trade. The findings also suggest that tourism is a driving force for the growth of other sectors and provides direct and indirect effect to overall economy.

Tansel (2014) studied Asian, African and European countries, to find out the relationship between tourism and economic growth by using Dumitrescu and Hurlin panel granger causality testing. The results find that causality is from tourism to economic growth. In some countries the causality is opposite it may be because tourism sector is linked with other sectors and creates an indirect demand for other sectors either the economies are at the early stage of growth. The less facilities provided by the developing countries may be one of the cause for opposite direction. While European countries get much benefit from the tourism may be due to higher developed nations and proper policies for the growth of tourism.

The research studies based on EKC theoretical framework also tried to assess the impact of economic growth on the environmental quality, such as measured review of carbon emission, sulfur dioxide levels, river pollutants, or particulate matter and deforestation (Shafik and Bandhyopadhyay, 1992, Seldon and Song, 1994, Panayotou, 1997, Banday, Assawa and Kaushik, 2014 and Grossman and Krueger, 1991). Empirical outcomes recommend that EKCs exist but statistical results are not constant across all indicators of environmental quality. It depends upon the type of environmental quality measure selected, country or group of countries in the study, other explanatory variables used in the model, choosing a different econometric technique and the time period selected for the study, results are mixed. In addition, findings are also sensitive to the econometric technique selected for the analysis (Stern, Common, & Barbier, 1996, Ismail and Ahmed, 2016). The aim of the study is to investigate the casual relationship between tourism and economic growth among the BRICS countries.

3. Data and Methodology
3.1. Data

The annual date set has been used for the period 1995-2013 for the study. The set of data includes Gross Domestic Product (GDP) in constant US$, International Tourism Receipts (TREC) in current US$, Gross Fiscal Capital (GFC) in constant US$, Carbon Emissions ($CO_2$) in billions tones and Total Labors (TLAB) in the BRICS nations. The series of variables has been collected from the World Bank, World Tourism Organization and World tourism database.

3.2. Methodology

Unit Root test:

We will start with unit root test (Cross sectional independence) Im, Pesaran and Shin (2003, IPS hereafter) and the Levin, Lin and Chu t-test (2002, hereafter LLC). Im, Pesaran and Shin (2003, IPS hereafter) is based on the traditional augmented Dickey Fuller specification;

$$\Delta y_{it} = \mu_i + \delta_i t + \rho_y y_{it-1} + \sum_{k=l}^{\rho_i} \gamma_{ik} \Delta y_{it-k} + v_{it} \qquad 1$$

IPS allows for a heterogeneous coefficient of y_{it-1} and proposes a testing procedure based on averaging individual unit root test statistics and the null hypothesis is given by the existence of a unit root in all the units of the panel against the alternative of at least one stationary cross-section. To test the hypothesis, Im *et al*. (2003) propose a standardized t-bar statistic given by:

$$z_{tbar} = \frac{\sqrt{N}\{tbar_{NT} - \frac{1}{N}\Sigma_{i=1}^{N} E[t_{iT}(p_i,0)\,\beta_i=0]\}T,N\,T,N}{\sqrt{\frac{1}{N}\Sigma_{i=1}^{N} Var\,[t_{iT}(p_i,0)]\,\beta_i = 0}} \Rightarrow N(0,1) \qquad 2$$

The Levin, Lin and Chu t-test (2002, hereafter LLC) test is carried out by estimating the following equation:

$$\Delta y_{i,t} = \alpha_i + \beta_i y_{i,t-1} + \sum_{i=l}^{L_i} \vartheta_{ik} \Delta y_{i,t-i} + \varepsilon_{i,t} \qquad 3$$

We will use ADF - Fisher Chi-square test and PP - Fisher Chi-square unit root tests.

ARDL Bound Testing:

We have used time series data for BRICS countries from 1995-2013 for econometric analysis. We used Im, Pesaran and Shin (2003, IPS) and the Levin, Lin and Chu t-test (2002, hereafter LLC) to check the stationarity and non-stationarity of variables. After checking staitinarity of the variables we used bound testing method for ARDL co-integration suggested by Pesaran et al (2001).

$$\Delta GDP_t = C + w_1 GDP_{t-i} + w_2 TREC_{t-I} + w_3 TLAB_{t-I} + w_4 GFC_{t-I} + \Sigma_{i-1}^{p}\,\alpha_{1i}\,\Delta GDP_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{2i}\,\Delta TREC_{t-i}$$
$$+\Sigma_{i-1}^{p}\,\alpha_{3i}\,\Delta TLAB_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{4i}\,\Delta GFC_{t-i} + \varepsilon_{1t} \qquad 4$$

$$\Delta TREC_t = C + Y_1 TREC_{t-i} + Y_2 GDP_{t-I} + Y_3 TLAB_{t-I} + Y_4 GFC_{t-I} + \Sigma_{i-1}^{p}\,\alpha_{1i}\,\Delta GDP_{t-} + \Sigma_{i-1}^{p}\,\alpha_{2i}\,\Delta TREC_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{3i}$$
$$\Delta TLAB_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{4i}\,\Delta GFC_{t-i} + \varepsilon_{2t} \qquad 5$$

$$\Delta TLAB_t = C + x_1 TLAB_{t-i} + x_2 TREC_{t-I} + x_3 GFC_{t-I} + x_4 TLAB_{t-I} + \Sigma_{i-1}^{p}\,\alpha_{1i}\,\Delta GDP_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{2i}\,\Delta TREC_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{3i}$$
$$\Delta TLAB_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{4i}\,\Delta GFC_{t-i} + \varepsilon_{3t} \qquad 6$$

$$\Delta GFC_t = C + z_1 GFC_{t-i} + z_2 TREC_{t-I} + z_3 TLAB_{t-I} + z_4 GDP_{t-I} + \Sigma_{i-1}^{p}\,\alpha_{1i}\,\Delta GDP_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{2i}\,\Delta TREC_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{3i}$$
$$\Delta TLAB_{t-i} + \Sigma_{i-1}^{p}\,\alpha_{4i}\,\Delta GFC_{t-i} + \varepsilon_{4t} \qquad 7$$

In the above equation ARDL model has been developed, the Δ change represents the difference of the variable and ε is the error term. In ADRL method we have upper bound and lower bound, when F statistic is greater that upper bound we can say there is a co-integration among the

variables as vice versa for lower bound. When we find the F statistic larger we can check normality, auto-correlation and Heteroskedasticity. We will check structural breaks also because ARDL is sensitive to it by using CUSUM and CUSUMSQ charts to find such issues.

Granger Causality Test:

Granger causality test is used to estimate the direction of the variables. The ARDL model will give the statistical relationship between dependent and independent variables but will not give the causality and the direction of relationship among variables. We may find bidirectional, unidirectional relationship among the variables. We will apply Granger causality test to find out the direction and causal relationship among the variables. The equation below will be employed for Granger causality test.

$$\Delta GDP_t = \alpha_1 + \Sigma\beta_1 \Delta TREC_{t-i} + \Sigma\theta_1 \Delta GFC_{t-i} + \Sigma\delta_1 \Delta LAB_{t-i} + \varepsilon_t \qquad\qquad 8$$

$$\Delta TREC_t = \alpha_2 + \Sigma\beta_2 \Delta GDP_{t-i} + \Sigma\theta_2 \Delta GFC_{t-i} + \Sigma\delta_2 \Delta LAB_{t-i} + \varepsilon_t \qquad\qquad 9$$

$$\Delta GFC_t = \alpha_3 + \Sigma\beta_3 \Delta GDP_{t-i} + \Sigma\theta_3 \Delta TREC_{t-i} + \Sigma\delta_3 \Delta LAB_{t-i} + \varepsilon_t \qquad\qquad 10$$

$$\Delta LAB_t = \alpha_4 + \Sigma\beta_4 \Delta GDP_{t-i} + \Sigma\theta_4 \Delta TREC_{t-i} + \Sigma\delta_4 \Delta GFC_{t-i} + \varepsilon_t \qquad\qquad 11$$

Multi-Regression:

We developed the multi linear regression model to study the relationship between dependent and independent variables. The best quality is amenable to ceteris paribus because it allows us to explicitly control on many other factors that also affects the dependent variables. By this equation we can find the exact relationship among the variables.

$$Y_t = \alpha_o + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \mu_t \qquad\qquad 12$$

In equation 12 the variables are defined as Y is carbon emission, X_1 is Gross Domestic Product (GDP), whereas X_2 is Gross Fixed Capital (GFC), X_3 is tourism revenue and X_4 is total labor forces. Y is the dependent variable to our model and can be predicted. Where α_o is the intercept and μ is a random term which we call disturbance because we cannot hope to capture every influence by an economic variable. Where β_1 measures the change in Y with respect to X_1, which is useful for generalizing relationship between variables.

$$Y_t = \alpha_o + \beta_1 X_{1t} + \beta_2 X_{2t} + \mu_t \qquad\qquad 13$$

In equation 13 we try to validate the EK-curve relationship we have made a quadratic form of GDP as a GDP^2 to test if carbon emission follows Inverted Kuznets Curve; we hypothesize carbon emissions as a function of GDP and GDP^2.

4. Empirical Results

This section deals with the empirical results based on unit root, ARDL and Granger causality testing. Table 1 and table 2 gives us the results of panel unit root test LLC, IPS, ADF-Fisher and PP-Fisher both on constant and trend. Results of unit root suggest some variables are stationary at level some are non-stationary at level and after first differencing all variables become stationary. So we can apply ARDL model for co-integration test to determine the long run relationship between GDP TREC, GFC, $C0^2$ and TLAB in India.

Table 1: Panel Unit Root Test Conclusion (I_0)

Variables	LLC		IPS	
	Constant	Trend	Constant	Trend
GDP	(0.718)	(0.109)	(1.000)	(0.383)
TREC	(0.003)	(0.109)	(0.588)	(0.383)
GFC	(0.900)	(0.073)	(1.000)	(0.179)
CO2	(0.991)	(0.079)	(0.997)	(0.396)
TLAB	(0.000)	(0.074)	(0.008)	(0.853)

Variables	ADF-Fisher		PP-Fisher	
	Constant	Trend	Constant	Trend
GDP	(1.000)	(0,517)	(1.000)	(0.928)
TREC	(0.325)	(0,517)	(0.000)	(0.928)
GFC	(1.000)	(0.146)	(1.000)	(0.553)
CO2	(0.978)	(0.295)	(0.978)	(0.141)
TLAB	(0,005)	(0.590)	(0.019)	(0.621)

Table 2: Panel Unit Root Test Conclusion (I_1)

Variables	LLC		IPS	
	Constant	Trend	Constant	Trend
GDP	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$	$(0.003)^a$
TREC	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$	$(0.003)^a$
GFC	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$	$(0.001)^a$
CO2	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$
TLAB	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$

Variables	ADF-Fisher		PP-Fisher	
	Constant	Trend	Constant	Trend
GDP	$(0.002)^a$	$(0.001)^a$	$(0.001)^a$	$(0.004)^a$
TREC	$(0.001)^a$	$(0.001)^a$	$(0.001)^a$	$(0.004)^a$
GFC	$(0.002)^a$	$(0.006)^a$	$(0.000)^a$	$(0.001)^a$
CO2	$(0.001)^a$	(0.295)	$(0.000)^a$	$(0.000)^a$
TLAB	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$	$(0.000)^a$

Source: *Computed by Authors.*

Note: *Critical value at the 1% significance level denoted by "a" without trend and with trend.*

Table 3 below gives results of long run relationship among the variables by applying ARDL co-integration approach. It needs maximum lag length it is based on Schwarz Bayesian criteria (SIC). The results of ARDL co-integration is based on F statistics. If the F statistic exceeds the upper bound limit at 95% and 90%, this implies null hypothesis of no co-integration is rejected and have an evidence of co-integration among the variables. This also implies tourism is important factor which determines that economic growth in those countries.

Table 3: Estimated ARDL Model by Schwarz Bayesian Criterion

Regressor	Coefficient	Standard Error	*t*-ratio [prob.]
GDP	.72464[a]	.092208	7.8588 [.000]
GFC	1.0793[a]	.28309	3.8125 [.002]
TLAB	233.46[a]	67.866	3.4400 [.004]
TREC	458.26[a]	383.555	1.1948 [.005]
Testing Bound ARDL F-Statistic			
F-Statistic	**95%upper Bound**	**90% upper Bound**	
37.9495	4.5717	3.6657.	

Note: *If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. Superscripts a and b denote 1% and 5% significance.*
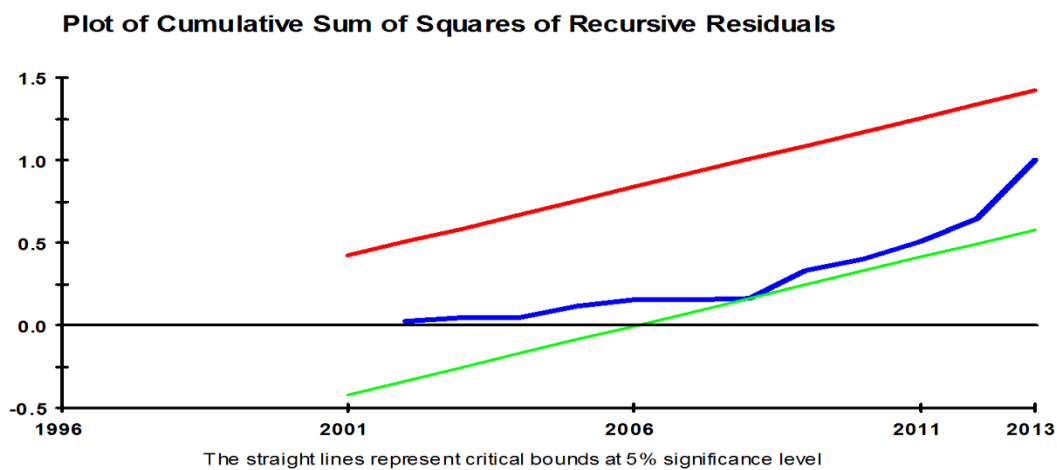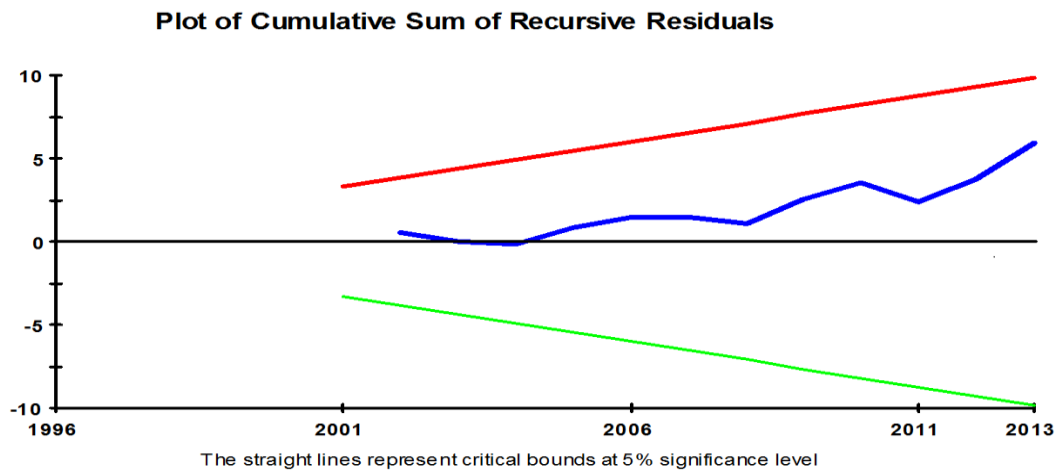
Table 4 below gives us the results of error correction mechanism (ECM) for short run results of the variables. Here the value of error correction mechanism should be negative this will give you an evidence that there is a long run relationship among the variables. The significant value shows the significant effects on dependent variable in short run. When the variables have short and long run causal effects, we can say those variables have a strong dependency on each other. So EKC also suggests that when the economies grow the environmental problems will either increase or decrease depends on the development of the country. So we can say tourism being the important variables which cause economic growth in both in short and long run and it will help the countries to tackle the environmental problems. The CUSUM and CUSUMSQ charts makes us clear that there is no issue related to structural break, because neither of three lines red, blue and green crosses each other in both the charts.

Table 4: ECM ARDL Results

	Estimated short-run coefficients		
Regressor	Coefficient	Standard Error	*t*-ratio [prob.]
DGFC	1.0793[a]	.28309	3.8125 [.002]
DTLAB	233.46 [a]	67.8669	3.4400 [.004]
DTREC	458.266[a]	383.555	1.1948 [.005]
ECM (-1)	-.27536[a]	.092208	2.9862 [.010]

Note: *Superscripts a and b denote 1% and 5% significance.*

Figure 2: CUSUM Chart 1 and CUSUMSQ Chart 2

Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Note: *Graphs are plotted on the basis of results and computed by Author*

Diagnostic Tests

Test Statistic	LM version	F-version
Serial Correlation	.49965 [.480]	.34261[.569]
Normality	.54205 [.763]	
Heteroskedasticity	4.2399 [.039]	4.9301[.041]
Reset Test	2.9321 [.087]	2.3351[.152]

Note: *LM is the Lagrange Multiplier test of residual serial correlation. Heteroskedasticity test is based on the regression of squared residuals on squared fitted values. Ramsey's RESET test uses the square of the fitted values. Normality test is based on a test of skewness and kurtosis of residuals.*

The co-integration relationship among the variables suggests that there is Granger causality at least from one direction. Granger causality test has been applied for GDP, TREC, GFC and TLAB. Table 5 below provides the results of causality from GDP to TREC, TLAB to GDP, GFC to GDP and TREC TO GDP. It shows TREC causes GDP and GDP cause TREC which gives us a bidirectional results and we can say tourism has a strong effect on economic growth and which in turn can affect the sustainability of environmental both positively and negatively depends upon the development of the country and human consciousness. Beside that TLAB also causes GDP and GFC cause TREC, which is being also the part of tourism which provides both direct as well as indirect employment and proves growth lead hypothesis. It has been seen the country which is developed they work for sustainability and more peoples are attracted to visit such places which is green and healthy.

Table 5: Granger Causality Test Results

Null Hypothesis	F-statistic	Df	Prob
TREC does not Granger Cause GDP	4.99081^a	2	0.0091
GDP does not Granger Cause TREC	9.97468^a	2	0.0001
TLAB does not Granger Cause GDP	5.76724^a	2	0.0046
GDP does not Granger Cause TLAB	2.22303	2	0.1149
GFC does not Granger Cause GDP	2.64989^b	2	0.0769
GDP does not Granger Cause GFC	2.29622	2	0.1072
TLAB does not Granger Cause GFC	1.72304	2	0.1851
GFC does not Granger Cause TLAB	4.02255^b	2	0.0216
TREC does not Granger Cause GFC	1.85308	2	0.1634
GFC does not Granger Cause TREC	9.72039^a	2	0.0002
TREC does not Granger Cause TLAB	1.34818	2	0.2655
TLAB does nor Granger Cause TREC	11.0471	2	0.6525

Source: *Computed by Authors*

Note: *When probability value is more than 0.5% we accept null hypothesis. Superscripts a and b denote 1% and 5% significance.*

Table 6 below gives the results of regression between Co^2 emissions, tourism revenue and economic growth. The results find that the growth of tourism leads faster road to economic growth, and proves tourism led-growth hypothesis. In table 7 we test the hypothesis that carbon emission follows the EK-Curve, we assume carbon emission as a function of GDP. The results reveal that tourism growth leads negative impact on environment with the increase in externalities in the form of environmental pollution. The tourism has a significant impact on pollution and waste due to inadequate facilities. The number of tourists increases the pollution level also increases. We review the basic EKC studies that focus on the income-environment relationship. The EKC also suggests that when the economy is in a developing stage the pollution level increases and after some time when economy develops they transfer to a good technology and reduce the pollution level.

Table 6: Regression between Co2 Emission, Tourism Revenue, GFC and GDP

Co2 Emission	Coef	Std. Err	P	t	R^2	Obs
TREC	4.9809^a	1.4609	0.001	3.41	0.937	95
GDP	5.0313	5.0013	0.317	1.01		
GFC	2.6412^b	1.1612	0.025	2.27		
TLAB	1.1609	3.5310	0.201	3.29		
CONS	-.270885	.2376463	0.257	-1.14		

Source: *Computed by Authors*

Note*: Superscripts a and b denote 1% and 5% significance.*

Table 7: Country wise Regression between Co2 Emission, GDP and GDP^2

Country Name	Carbon Emission	Coef	P	t	R^2	Obs
India	GDP	1.9912^a	0.001	4.49	0.99	19
	GDP^2	-7.7825^a	0.002	-3.90		
Brazil	GDP	1.8012	0.588	0.56	0.77	19
	GDP^2	-8.2025^b	0.090	-0.41		
South Africa	GDP	7.5612^b	0.091	1.84	0.86	19
	GDP^2	-2.0223^b	0.022	-2.63		
China	GDP	-1.1611^b	0.018	-2.73	0.99	19
	GDP^2	2.0424^b	0.013	2.93		
Russia	GDP	-1.0512^b	0.073	-0.43	0.92	19
	GDP^2	2.8525	0.879	0.16		

Source: *Computed by Authors*

Note: *Superscripts a and b denote 1% and 5% significance.*

5. Conclusion

The aim of this study is to examine the causal relationship between tourism earnings and economic expansion (GDP) in the BRICS countries. The study employs panel ARDL co-integration and Granger causality testing. The relationship between economic growth and carbon emissions formulates the inverted U-shaped relationship which signals the existence of EKC hypothesis for BRICS countries from the time period 1995-2013.

Although the findings support the both hypothesis one is tourism lead growth hypothesis and inverted U shaped relationship between environment degradation and economic growth know as environmental Kuznets curve.

Using the ARDL co-integration and Granger causality test, the study explores the long run and short run relationship. A co-integration between tourism and economic growth exists in BRICS nations and the combination of results gives bi-directional results from tourism to economic growth and economic expansion is important for the growth of tourism in the BRICS countries and provides necessary arguments support tourism led-growth hypothesis. As expected the tourism revenue affects positively to economic growth.

However the linkage between environmental degradation and economic growth given by EKC, the results indicate with the increase in tourism the pollution level will increase which will eventually damage the environment and can argue that BRICS nations are in a developing stage, so that with the rise in income the environmental degradation will increase according to EKC.

Finally, the significant impact of tourism on economic growth drawn from the study that government generate the revenue, employment, income for the local resident and economic activity in the country through tourism development and on the other side tourism also lead environmental damages government has to develop appropriate policies, legislation and plans and instituted mechanism to apply strict standards, threshold limit and regulations for the sustainable tourism.

However, the study suggests testing the EKC hypothesis for individual countries as all five countries have dissimilar characteristics and different structural GDP composition.

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