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Is the Tourism-Led Growth Hypothesis Valid for the Dominican Republic: Results from the Bounds Test for Cointegration and Granger Causality Tests

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Abstract

The tourism-led growth hypothesis (TLGH) posits a positive relation between the growth of the tourism sector and overall economic growth. International tourism is an important sector of the Dominican economy and posted strong rates of growth over the past decades. Tourism receipts represent 10 percent of gross domestic product and 32 percent of total exports. The number of international visitors grew at a yearly average of 6.8 percent during the period 1991-2012. The strong growth of the tourism sector makes this an ideal case to examine the validity of the tourism-led growth hypothesis. Toward this end, this paper employs the 'bounds' testing approach to co-integration of Pesaran *et al*. (2001) and the results show the existence of a long-run equilibrium relationship between tourist arrivals and overall economic growth. Employing a method developed by Bårdsen (1989) to derive long-run coefficients the findings reveal that a one percent increase in tourist arrivals produces a 0.88 percent increase in overall economic growth. Moreover, Granger Pairwise causality tests show causality running from tourist arrivals to aggregate output expansion. These results in favor of the hypothesis of tourism-driven economic growth in the Dominican Republic suggest the need for the government to promote the tourism sector.

Key words: Tourism-led growth hypothesis, error correction model, 'bounds' test, Granger Pairwise causality tests

1. Introduction

The tourism-led growth hypothesis (TLGH) posits a positive relation between the growth of the tourism sector and overall economic growth. Brida and Pulina (2010) list five channels through which the tourism sector can exert a positive impact on economic growth. First, tourism increases foreign exchange earnings needed to pay for foreign-produced intermediate inputs and capital goods used in the production process. Second, tourism plays an important role in stimulating investments in private and public infrastructure and in human capital. Third, expenditure by visitors leads to additional economic activity in other industries via its direct, indirect and induced impacts. Fourth, tourism contributes to generate employment and income that activate consumption and investment among local economic agents. Lastly, tourism causes positive economies of scale and scope. The former allow businesses to reduce their average cost per unit of production. The latter help businesses to decrease their average total cost as a result of increasing the production of different products.

International tourism is an important sector of the Dominican economy. Tourism receipts represent 10 percent of gross domestic product and 32 percent of total exports. The tourism sector posted strong rates of growth during the period 1991-2012. The total number of international visitors grew at a yearly average of 6.8 percent, despite negative growth rates during 2001-2002 and growing at an annual average of only 0.23 percent during 2007-2009 (see Table A1 in the Appendix). Over the course of this period, the overall economy expanded at an average annual rate of 5.8 percent and experienced only one year of contraction. This robust growth rate was achieved in spite of total imports growing at the slightly higher yearly average of 5.9 percent. The strong growth of the international tourism sector makes this an ideal case to examine the validity of the tourism-led growth hypothesis.

The approach is as follows. First, we use the recently developed 'bounds' testing approach to the analysis of level relationship of Pesaran et al. (2001) to investigate the existence of a co-integration relationship between tourist arrivals and economic growth. Second, we estimate the long run coefficient of the responsiveness of output expansion to tourist arrivals using a method developed by Bårdsen (1989) for error correction models. Thirdly, we use Granger Pairwise causality tests to determine the direction of causality among the two variables of interest. The rest of this study is organized as follows. A short review of the tourism-led growth hypothesis is presented in the section titled "Literature Review." The model, variables, data and the method employed to conduct the empirical analysis are presented in the section titled "The Model, Variables, Data Sources, and Methodology" section. Empirical results are discussed in the section titled "International Tourist Arrivals and Overall Economic Growth – Results." The "Conclusion and Policy Implications" section summarizes the key findings of the study and offers policy recommendations.

2. Literature Review

The relationship between the expansion of the tourism sector and overall economic growth has recently been the focus of numerous empirical tests. Georgantopoulos (2013) analyzes the dynamics between tourism and economic growth in India during the period 1988-2011. Results from the Johansen cointegration test support the existence of a long-run equilibrium relationship between aggregated and disaggregated tourism expenditures and real GDP. Though Granger causality tests results for the aggregated model fail to show any causal links between total tourism expenditure and output growth, the application of the disaggregated model shows strong bidirectional causal links between tourism expenditure and economic growth. Kibara et al. (2012) use the bounds testing approach to cointegration and Granger causality tests to examine the dynamic relationship between tourism development and economic growth in Kenya. Their results indicate the existence of a long-run relationship between tourism development, trade, and economic growth in Kenya. Their causality results show that there is a uni-directional causality from tourism development to economic growth. Likewise, they find that international tourism Granger-causes trade in Kenya, both in the short and in the long run.

Kreishan (2011) applies Johansen-Julius cointegration and Granger causality tests to annual data covering the period 1970-2009 to examine the relationship between tourism earnings and economic growth in Jordan. The findings of this study show that there is a positive relationship between tourism and economic growth in the long-run. Moreover, the Granger causality test results revealed the presence of unidirectional causality from tourism earnings to economic growth. Samimi et al. (2011) examine the causal and long-run relationships between economic growth and tourism development in 20 developing countries using the panel vector autoregressive (P-VAR) approach during 1995-2009. The findings reveal that there is a bilateral causality and positive long-run relationship between economic growth and tourism development. Tang (2011) examines the tourism-growth nexus for Malaysia by applying the Johansen cointegration and the residuals-based tests for cointegration with regime shift and Granger causality tests to monthly data from January 1989 to May 2010. The results show that tourist arrivals, real output, and real effective exchange rate are cointegrated. Moreover, this study finds different sources of causality. In the short run, real output and real effective exchange rate Granger-cause tourist arrivals, while tourists arrivals also Granger-cause real output and real effective exchange rate. In the long run, the findings show the existence of bi-directional causality among the variables.

Brida et al. (2010) investigate the causal relations between tourism growth, relative prices and economic expansion for a region of northeast Italy. Johansen cointegration analysis shows the existence of one cointegrated vector among real GDP, tourism and relative prices, where the corresponding elasticities are positive. Tourism and relative prices are weakly exogenous to real GDP. A variation of the Granger Causality test developed by Toda and Yamamoto is performed and reveals uni-directional causality from tourism to real GDP. Impulse response analysis shows that a shock in tourism expenditure produces a fast positive effect on growth. de la Cruz Gallegos et al. (2010) test the tourism-led growth hypothesis and the relationship between consumption and tourist arrivals for Mexico. They report that tourism arrivals have a positive causal relationship over Mexican economic growth. They also find a bi-directional and long-run relationship between tourism arrivals and private consumption. These results, according to the authors of this study, illustrate the potential benefits for Mexican economic growth of an expansive policy in the tourism sector.

Brida et al. (2009) investigate the contribution of tourism to economic growth in Colombia by using the Johansen cointegration test and the Granger causality test. They find empirical evidence for one cointegrated vector among real per capita GDP, Colombian tourism expenditures and real exchange rates. The Granger causality test suggests that causality runs from tourism expenditures to real per capita GDP. Zortuk (2009) investigates the long-run and causal relations between the growth of GDP, tourist arrivals and exchange rate in Turkey over the period 1990Q1 – 2008Q3. The results of the Johansen's cointegration technique show a long-run equilibrium relationship between gross domestic product and tourist arrivals. Granger causality tests show evidence of a unidirectional causality running from tourist arrivals to economic growth.

3. The Model, Variables, Data Sources, and Methodology

In equation form, the relationship between international visitors and the gross domestic product of the Dominican Republic can be expressed as follows:

$$Y = f(T) \qquad (1)$$

where: Y is real gross domestic product and T represents the total number of international arrivals. Data on the Dominican Republic's gross domestic product (Y) and on the total number of arrivals (T) were downloaded from the Dominican Central Bank's web site. The GDP data are in constant 1991 pesos and were converted into an index number with 1991 = 100.

The econometric methodological framework for conducting the empirical analysis uses the recently developed 'bounds' testing approach of Pesaran et al. (2001). These researchers have developed a method for the analysis of time series that takes into consideration whether the variables under consideration are stationary or non-stationary. The former are characterized by fixed deterministic trends over time, whereas the latter are distinguished by random stochastic trends with respect to time. Failure to take into account the time series properties of the underlying variables can lead to spurious results and invalid inferences. This can happen, for instance, when an explanatory variable, which is stationary at level [known as an $I(0)$ variable] is regressed with another variable, which is non-stationary at level but is first-differenced stationary (known as an $I(1)$ variable]; then this would indicate a statistical relationship between the variables when in fact none exists, thus leading to unreliable statistical inferences. One way to avoid the problems of 'spurious results' is to estimate a dynamic function which includes lagged dependent and independent variables, i.e., an error correction model (ECM).

An error correction model is dynamic model "in which the change of one of the series is explained in terms of the lag of the difference between the series and lags of the differences of each series" …"[d]ata generated by such a model are sure to be co-integrated" (Granger 2004:422). This follows directly from Granger's Representation Theorem which states that if the dependent variable and the independent variable(s) are co-integrated, then an ECM representation generates co-integrated series (Engle and Granger, 1987). According to Harris (1995:25), "the practical implication of Granger's theorem for dynamic modelling is that it provides the ECM with immunity from the spurious regression problem, provided that the terms in levels co-integrate."

The 'bounds' testing methodology developed by Pesaran *et al*. (2001) uses an autoregressive distributed lag (ARDL) model to estimate an unrestricted error correction model (UECM). The ECM-based bounds testing approach has been chosen to conduct the econometric analysis of this research project because it offers the following advantages over alternative procedures. It can be reliably used to estimate and test hypotheses on the long-run coefficients irrespective of whether the underlying regressors are purely $I(0)$, purely $I((1)$, or mutually co-integrated. Therefore, unlike other applications of co-integration analysis, which require that the order of integration of the underlying regressors be ascertained prior to testing the existence of a long-run relationship between the dependent variable and the independent variables, this method does not necessitate a precise identification of the order of integration of the underlying data. It thus eliminates the uncertainty associated with pre-testing the order of integration; this can be particularly troublesome in studies that have a small sample size as is the case in the present study. Thus, the hypothesis of the relationship between tourist arrivals and overall output growth can be represented by the following ARDL/UECM equation:

$$\Delta \log Y = \chi_1 \log T_{t-i} + \chi_2 \log Y_{t-i} + \sum_{i=0}^{k} \chi_3 \Delta \log T_{t-i} + \sum_{i=1}^{k} \chi_4 \Delta \log Y_{t-i} + e \qquad (2)$$

where Δ is the first difference operator, T and Y are as previously defined, and e is the error term. Equation (2) was modified by including exogenously a dummy variable (DUMY) with value 0 for 2003 to capture the 2003 economic contraction and 1 for the other years.

In performing the ARDL/UECM estimation, the maximum number of lags of the level variables is set equal to one, and on the first-differenced variables the process starts off from a maximum of three lags, then the optimum number is chosen based on the Akaike's Information Criterion (AIC), the Ramsey RESET test, and the adjusted R^2. Thus, the formulation with the lowest AIC, the Ramsey RESET test results for the best-fit specification, and the highest adjusted R^2 is selected. After estimating Equation (2) the Wald F-test is used to assess the significance of the lagged level explanatory variables by imposing the following restrictions:

$H_o: \chi_1 = \chi_2 = 0$ (no co-integration exists)
$H_A: \chi_1 \neq \chi_2 \neq 0$ (co-integration exists)

Pesaran et al. (2001) provide two sets of critical value bounds covering the two polar cases of the included lagged level explanatory variables (Table A2). If the computed Wald *F*-statistic falls below the lower bound (indicating that $\chi_1 = \chi_2 = 0$), then this would lead us to conclude that there is no co-integration between tourist arrivals and overall output growth. If, on the other hand, the computed *F*-statistic exceeds the upper bound of the critical value (signifying that $\chi_1 \neq \chi_2 \neq 0$), then the alternative hypothesis of co-integration between tourist arrivals and overall output growth will be accepted.

After having established a co-integration relationship between total tourist arrivals and gross domestic product, the next logical step will be to derive the long-run coefficient. Following Bårdsen (1989), the long-run elasticity of total visitors to gross domestic product (μ) is $-(\chi_1/\chi_2)$. Engle and Granger (1987:259) point out that a two-variable co-integrated system must have a causal ordering in at least one direction. Thus, the study will then proceed to apply Pairwise Granger causality tests to establish whether there is a causal association between the variables. To implement the Granger causality test, the following model based on Granger (1969:431) will be estimated:

$$T_t = \sum_{j=1}^{m} a_j T_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \varepsilon_t,$$

$$Y_t = \sum_{j=1}^{m} c_j Y_{t-j} + \sum_{j=1}^{m} d_j T_{t-j} + \eta_t \qquad (3)$$

where T and Y are as previously defined and assumed to be two stationary time series with zero means, and ε_t and η_t are taken to be two uncorrelated white-noise series. Granger's definition of causality expressed by Equation (3) implies that Y_t is causing T_t provided some b_j is not zero. Likewise, T_t is said to be causing Y_t provided some c_j is not zero. If either of these cases exists, then there is a one-way causality between T_t and Y_t. However, if both of these events occur, there is a two-way causal relationship between T_t and Y_t.

4. International Tourist Arrivals and Overall Economic Growth – Results

The estimates of examining the tourism-led growth hypothesis for the 1991-2012 period are presented in Table A3. The Wald *F*-statistic is 6.31 and exceeds the upper bound value for all four levels of significance (see Table A1). The estimate of the long run coefficient shows that a one percent increase in tourist arrivals produces a 0.88 percent increase in GDP growth. The coefficient of determination (R^2) shows that this equation explains 69 percent of the variation in tourist arrivals and aggregate output. The estimated equation passes a battery of diagnostic tests up to third order. The Breusch-Godfrey's LM test for serial correlation rejects the presence of serial correlation. The ARCH test rejects the existence of first and second order heteroskedasticity in the disturbance term. The Ramsey RESET specification test shows no general equation specification error. The plots of the CUSUM test (Figure A1) and of the CUSUM of Squares test (Figure A2) reveal that the estimated parameters are stable over the sample period.

Moreover, the findings presented in Table A4 show the existence of a causal link running from total tourist arrivals to gross domestic product up to two lags. They therefore provide further evidence supporting the tourism-led growth hypothesis over the course of the 1991-2012 period.

5. Conclusion and Policy Implications

This study has employed the 'bounds' testing approach to co-integration and Granger Pairwise causality tests to examine the long-run equilibrium and causal relationships between international tourist arrivals and overall economic performance in the Dominican Republic during the period 1991-2012. The econometric results show the existence of a co-integration relationship between total tourist arrivals and aggregate economic growth, with an estimate of the long run coefficient showing that a one percent increase in tourist arrivals produces a 0.88 percent increase in GDP growth. Furthermore, Granger Pairwise causality tests prove a causal linkage running from international tourist arrivals to aggregate economic growth. These results in favor of the hypothesis of tourism-driven economic growth in the Dominican Republic suggest the need for the government to promote the tourism sector.

The tourism sector can exert a positive impact on aggregate economic performance through numerous channels. One of the means through which the tourism economy can be the engine of overall economic growth is by generating foreign exchange earnings needed to pay for imports. This outcome is particularly critical for a country like the Dominican Republic with a highly import dependent structure of production and consequently vulnerable to a foreign exchange constraint on output expansion. Since the tourism industry can help alleviate the balance of payments constraint on growth, this suggests the need for the two-pronged expansive government policy proposed by Balaguer and Cantavella-Jordá (2000) aimed to promote and increase the international tourism demand as well as stimulate the development of a private and public infrastructure capable of satisfying the resultant increase in demand.

APPENDIX

Table A1: Key Economic Indicators, 1991-2012

	GDP[1]	Growth	Imports[1]	Growth	Visitors	Growth
1991	$123,426		$53,144		1,177,819	
1992	$136,402	10.5%	$64,464	21.3%	1,415,147	20.1%
1993	$146,254	7.2%	$69,181	7.3%	1,509,035	6.6%
1994	$149,622	2.3%	$75,440	9.0%	1,614,978	7.0%
1995	$157,842	5.5%	$79,272	5.1%	1,775,872	10.0%
1996	$169,098	7.1%	$82,230	3.7%	1,925,565	8.4%
1997	$182,634	8.0%	$97,542	18.6%	2,211,394	14.8%
1998	$195,437	7.0%	$117,980	21.0%	2,309,139	4.4%
1999	$208,562	6.7%	$119,248	1.1%	2,655,494	15.0%
2000	$220,359	5.7%	$129,370	8.5%	2,978,024	12.1%
2001	$224,346	1.8%	$123,323	-4.7%	2,881,999	-3.2%
2002	$237,331	5.8%	$125,210	1.5%	2,811,017	-2.5%
2003	$236,730	-0.3%	$109,032	-12.9%	3,282,138	16.8%
2004	$239,836	1.3%	$114,767	5.3%	3,450,392	5.1%
2005	$262,051	9.3%	$127,725	11.3%	3,690,692	7.0%
2006	$290,015	10.7%	$138,210	8.2%	3,965,055	7.4%
2007	$314,593	8.5%	$147,638	6.8%	3,979,582	0.4%
2008	$331,127	5.3%	$154,600	4.7%	3,979,672	0.0%
2009	$342,564	3.5%	$139,382	-9.8%	3,992,303	0.3%
2010	$369,117	7.8%	$159,484	14.4%	4,124,543	3.3%
2011	$385,664	4.5%	$164,041	2.9%	4,306,431	4.4%
2012	$400,658	3.9%	$165,623	1.0%	4,562,606	5.9%
Average		5.8%		5.9%		6.8%

1. In millions of constant (1991) pesos.

Table A2: Critical value bounds for the Wald *F*-statistic

Level of Significance	**Lower Bound Value *I*(0)**	**Upper Bound Value *I*(1)**
1.0%	4.81	6.02
2.5%	3.88	4.92
5.0%	3.15	4.11
10.0%	2.44	3.28

Source: Pesaran *et al*. (2001), Table C1.i: Case I: No intercept and no trend.

Table A3: Results of ARDL/UECM for tourist arrivals and GDP, 1991-2012
Dependent variable: GDP
Included observations: 19 after adjustments

Regressor	Coefficient	*t*-Statistic	Probability
Log*T* (-1)	0.164	3.00	0.011
Log*Y* (-1)	-0.186	-3.15	0.008
Dlog*T*	0.310	3.19	0.008
Dlog*T* (-1)	-0.303	-2.90	0.013
Dlog*T* (-2)	-0.066	-0.79	0.447
Dlog*Y* (-1)	0.376	2.26	0.043
DUMY	0.117	4.14	0.001
Elasticity (μ)	0.88		
Model Criteria			
R^2	0.691		
Adjusted R^2	0.537		
DW	2.395		
SER	0.019		
Wald *F*-Test	6.310		0.013
Diagnostic Tests	[1]	[2]	[3]
Breusch-Godfrey LM	1.043 (0.329)	0.760 (0.493)	0.831 (0.509)
ARCH	0.079 (0.782)	0.817 (0.462)	0.861 (0.488)
Ramsey RESET	0.694 (0.422)	2.012 (0.184)	1.207 (0.362)

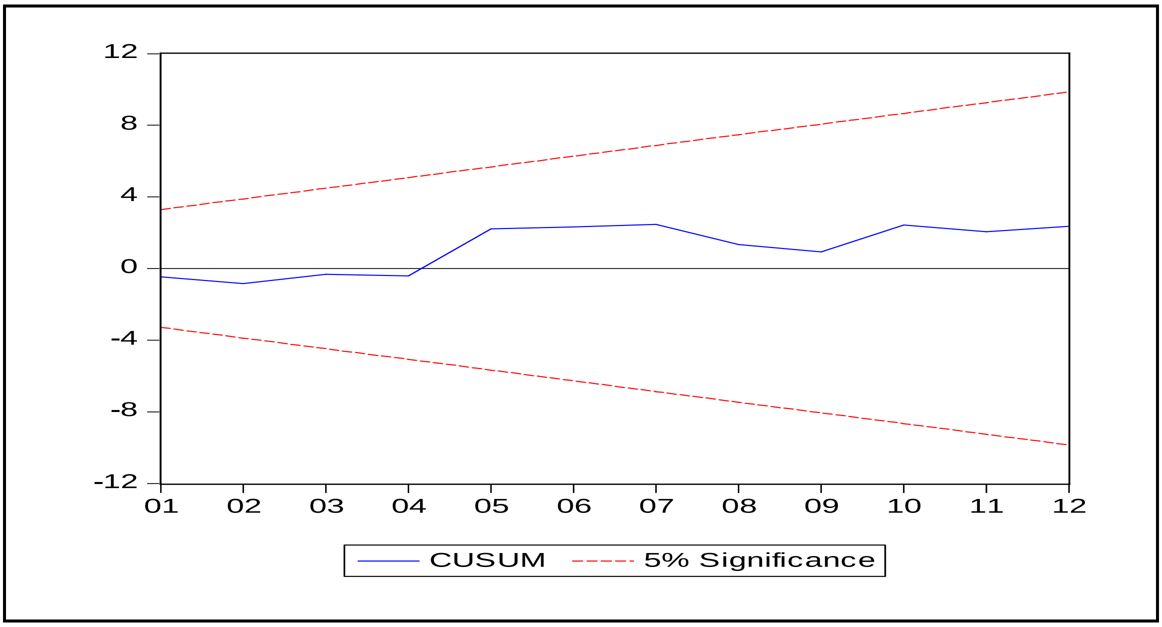

Figure A1: CUSUM test for ARDL/UECM for tourist arrivals and GDP, 1991-2012

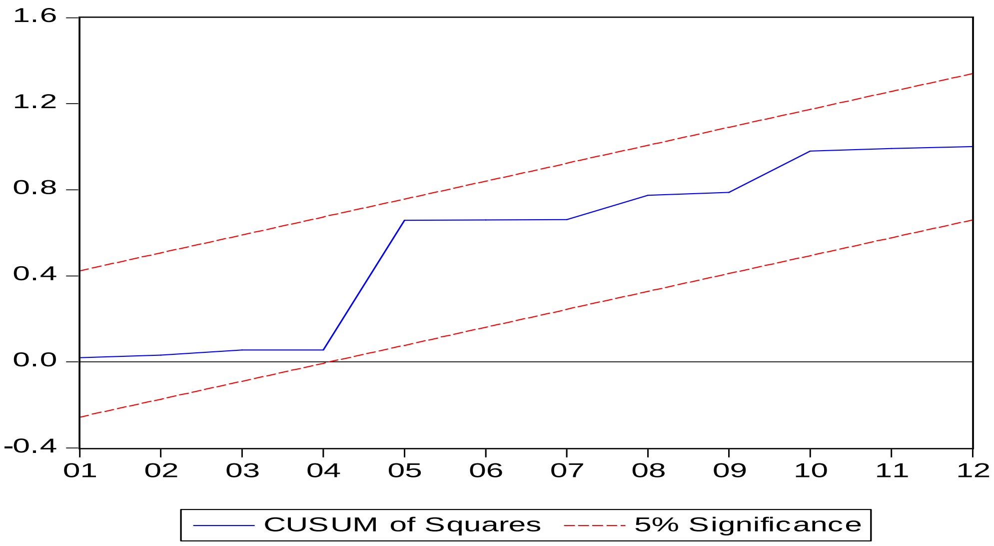

Figure A2: CUSUM of squares test for ARDL/UECM for tourist arrivals and GDP, 1991-2012

Table A4: Pairwise Granger causality tests, 1991-2012

Null Hypothesis:	Observations	*F*-Statistics	Probability
One Lag:	21		
log*T* does not Granger Cause log*Y*		1.295	0.270
log*Y* does not Granger Cause log*T*		0.335	0.570
Two Lags:	20		
log*T* does not Granger Cause log*Y*		1.176	0.335
log*Y* does not Granger Cause log*T*		0.154	0.859
Three Lags:	19		
log*T* does not Granger Cause log*Y*		1.223	0.344
log*Y* does not Granger Cause log*T*		1.697	0.221

References

Bårdsen, G. (1989), Estimation of Long Run Coefficients in Error Correction Models, *Oxford Bulletin of Economics and Statistics*, 51, 346-351.

Balaguer, J., and Cantavella-Jordá , M. (2000), Tourism as a Long-run Economic Growth Factor: The Spanish Case, *WP-EC 2000-10*, 1-15.

Brida, J. G. and M. Pulina (2010), A Literature Review on the Tourism-Led Growth Hypothesis, Center for North South Economic Research - *Working Paper 2010/17*, 1-26.

_____, Barquet, A., and Risso, W. A. (2010), Causality Between Economic Growth and Tourism Expansion: Empirical Evidence from Trentino-Alto Adige, *Tourismos: An International Multidisciplinary Journal of Tourism*, Volume 5, Number 2, Autumn, 87-98.

_____, Pereyra, J. S., Risso, W. A., Such Devesa, M. J., and Zapata Aguirre, S. (2009), The Tourism-Led Growth Hypothesis: Empirical Evidence from Colombia, *Tourismos:An International Multidisciplinary Journal of Tourism*, Volume 4, Number 2, Autumn, 13-27.

de la Cruz Gallegos, J. L., Rivera, C. C. , and Núñez Mora, J. A., (2010), Drivers of Economic Growth: The Case for Tourism in Mexico, *Revista RBEE*, 10, No. 2, 38-53.

Georgantopoulos, A. G., (2013), Tourism Expansion and Economic Development: VAR/VECM Analysis and Forecasts for the Case of India, *Asian Economic and Financial Review*, Volume 3, No. 4, 464-482.

Granger, C. W. J. (1969), Investigating Causal Relations by Econometric Models and Cross-Spectral Methods, *Econometrica*, 37, 424-438.

Engle, R. F. and C. W. J. Granger (1987), Co-integration and Error Correction: Representation, Estimation, and Testing, *Econometrica*, 55, 251-276.

Granger, C. W. J. (2004), Time Series Analysis, Co-integration, and Applications,*American Economic Review*, 94, 421-425.

Harris, R. I. D. (1995), *Using Co-integration Analysis in Econometric Modelling*, Prentice Hall/Harvester Wheatsheaf, London.

Kibara, O. N., Odhiambo, N. M., and Njuguna, J. M. (2012), Tourism and Economic Growth in Kenya: An Empirical Investigation, *International Business and Economic Research Journal*, Volume 11, No. 5, 517-527.

Kreishan, F. M. (2011), Time –series Evidence for Tourism-led Growth Hypothesis: A Case Study of Jordan, *International Management Review*, Vol. 7, No. 1.

Pesaran, M. H., Shin, Y., and Smith, R. J. (2001), Bound Testing Approaches to the Analysis of Level Relationships, *Journal of Applied Econometrics*, 16, 289-326.

Samimi, A. J., Sadeghi, S., and Sadeghi, S. (2011), Tourism and Economic Growth in Developing Countries: P-VAR Approach, *Middle-East Journal of Scientific Research*, 10 (1), 28-32.

Tang, C. F. (2011), Tourism, Real Output, and Real Effective Exchange Rate in Malaysia: A View from Rolling Sub-samples, *MPRA Paper*, No. 29379, 1-21.

Zortuk, M. (2009), Economic Impact of Tourism on Turkey's Economy: Evidence from Cointegration Tests, *International Research Journal of Finance and Economics*, Issue 25, 231-239.