Tourism and Economic Growth in Sri Lanka: An ARDL Bounds Testing Approach

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The purpose of the study is to examine the impact of tourism on economic growth in Sri Lanka through the Autoregressive Distributed Lag (ARDL) bounds testing approach. The analysis was carried out for the period from 1969 to 2009. By and large, our analysis reveals that the tourism has a positive impact on economic growth in Sri Lanka both in the short-run and long-run. Hence, it is crucial for the Sri Lankan government to achieve unification and stability by focusing on political solutions to a sustainable long-term conflict resolution in order to attract more tourism arrivals and thereby the Sri Lanka can enhance its economic growth.

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I. Introduction

Tourism has become the world's largest industry and creator of jobs across national and regional economies. The World Tourism Organization (WTO) has calculated that tourism accounts for around 10 per cent of the world's gross domestic product, making it the most significant economic sector. Further, exports of tourism services are about 6-7 percent of total exports of goods and services (Reo et al., 2004). Many developing countries have acknowledged the possible contribution that this industry can contribute to economic development (Sharpley, 2000). Besides, the employment generated by tourism and travel are spread across the economy - in retail, construction, manufacturing and telecommunications, as well as directly in Travel and Tourism companies. Tourism induces the local government to make infrastructure improvements such as better water and sewage systems, roads, electricity, telephone and public transport networks. This can improve the quality of life for residents as well as facilitate tourism. Furthermore, tourism is a significant contributor to a nation's GDP. Foreign exchange earnings from tourism constitute a major percentage of gross receipts. Thus, tourism is often one of the few realistic options for development in many areas. Therefore, there is a strong likelihood that the tourism industry will continue to grow globally over the short to medium term.

According to World Tourism Organization (WTO), today over 40% of global tourism arrivals take place in the developing world. The tourism industry in Sri Lanka has grown steadily over the years. The Ceylon Tourist Board was established in 1966 in order to provide

direction and leadership to this promising sector of the developing economy. At present, it is one of the major foreign exchange generating industries in Sri Lanka and nearly 1, 50,000 people directly or indirectly depend on the industry for their livelihood. During the last two decades, Sri Lankan tourism has had many set-backs mainly due to the uncertain security situation that prevailed in the country. This situation has been further exacerbated by the Tsunami of 2004, which devastated nearly 2/3rd of the coastal area and many of the tourist hotels located along the coastal belt. Further, the global economic recession also had a major impact on the industry. Due to these adversities, the sector showed an overall 11.7 percent drop in tourists for the year 2007, compared with the previous year. Threat of violence also caused a 31.4 percent year-on-year plunge in visitors for August 2008. Still, the ministry of tourism itself aims to take a strategic approach to promote Sri Lanka as a leading tourism destination. The Sri Lankan government has expected tourism to be an important growth mechanism, as it provides an important source of foreign exchange earnings. Thus, there is a need to investigate the impact of tourism on economic growth in Sri Lanka. The remaining of the paper is organized in the following way. Section II dwells on literature review. Section III presents the econometric methodology, section IV contains empirical results and discussion, and finally, concludes are drawn in section V.

II. Review of Literature

There have been several empirical studies which explored the impact of tourism on economic growth in emerging economies (Gamage, 1978, King and Gamage, 1994 and Ihalanayake, 1996). Hazari and Sgro (1995) developed a growth model in which they model tourism as an added component to the domestic aggregate demand. Furthermore, they model the foreign supply of capital and the growth in export as dependent on tourism growth. Wanhill (1983) investigated

co-integration and causality between tourism and economic growth in Mauritius and found that tourism has contributed to economic growth. Moreover, he claimed that tourism has a significant positive impact on Mauritian economic development. Balaguer and Cantavella-Jordá (2002) investigated the causality between tourism and economic growth in Spain and found that tourism has contributed to economic growth. Furthermore, they claimed that tourism has a significant positive impact on Spanish economic development. Dritsakis (2004) examined the impact of tourism on economic growth of Greece. He concluded that there is a strong unidirectional causality runs from international tourism receipts to economic growth. Moreover, Kasman and Kasman (2004), Yildirim and Öcal (2004), Gündüz and Hatemi (2005) and Aslan (2008) found that there exists unidirectional causality running from tourism towards the economic growth. Wickremasinghe and Ihalanayake (2006) examined the causal relationship between tourism and economic growth using multivariate cointegration, error-correction modelling and variance decomposition analysis. The results of the study suggest that there is a significant causal relationship from tourism receipts to the Gross Domestic Product (GDP) of Sri Lanka. Yavuz (2006), in his study found that there is no causality relationship between tourism income and economic growth for the Turkey based on the Granger causality test results and Toda-Yamamoto approach. Recently, Zortuk (2009) investigated the relationship between the expansion in tourism and economic growth using Granger causality test based on VECM and he discovered that a unidirectional causality from tourism development to economic development exists between the two variables.

From the above literature survey, it is clear that most of the empirical studies were mainly focused on emerging economies. However, studies regarding Sri Lankan case are found to be meager. Besides, the majority of the previous studies have mainly used either the residual-based cointegration test associated with Engle and Granger (1987) or

the maximum likelihood test based on Johansen (1988) and Johansen and Juselius (1990). Yet it is now well known that these cointegration techniques may not be appropriate when the sample size is too small (see Narayan and Smyth, 2005 and Odhiambo, 2009). The present study attempts to investigate the impact of tourism on economic growth in Sri Lanka using the newly developed ARDL-Bounds testing approach. Unlike other cointegration techniques, the ARDL does not impose a restrictive assumption that all the variables under study must be integrated of the same order. Secondly, while other cointegration techniques are sensitive to the size of the sample, the ARDL test is suitable even if the sample size is small.

III. Methodology

The Autoregressive Distributed Lag (ARDL) bounds testing approach has been employed in this paper to examine the impact of tourism on economic growth in Sri Lanka. The ARDL modeling approach was originally introduced by Pesaran and Shin (1999) and further extended by Pesaran, Shin and Smith (2001). This approach is based on the estimation of an Unrestricted Error Correction Model (UECM) which enjoys several advantages over the conventional type of cointegration techniques. First, it can be applied to a small sample size study (Pesaran *et al.*, 2001) and therefore conducting bounds testing will be appropriate for the present study. Second, it estimates the short- and long-run components of the model simultaneously, removing problems associated with omitted variables and autocorrelation. Third, the standard Wald or F-statistics used in the bounds test has a non-standard distribution under the null hypothesis of no-cointegration relationship between the examined variables, irrespective whether the underlying variables are I(0), I(1) or fractionally integrated. Fourth, this technique generally provides unbiased estimates of the long-run model and valid t-statistic even when some of the regressors are endogenous (Harris and Sollis 2003). Inder (1993) and Pesaran and Pesaran (1997)

have shown that the inclusion of the dynamics may correct the endogenity bias. Fifth, the short as well as long-run parameters of the model could be estimated simultaneously. Sixth, once the orders of the lags in the ARDL model have been appropriately selected, we can estimate the cointegration relationship using a simple Ordinary Least Square (OLS) method.

In view of the above advantages, ARDL-UECM used in the present study has the following form as expressed in Equation (1):

$$\Delta InG_t = \beta_0 + \sum_{i=1}^{p} \delta_1 \Delta InT_{t-i} + \sum_{i=0}^{q} \delta_2 \Delta InG_{t-i} + \beta_1 InG_{t-1} + \beta_2 InT_{t-2} + \varepsilon_t \qquad (1)$$

where, *G* and *T* are gross domestic product and tourism receipts, respectively; Δ denotes a first difference operator; it represents natural logarithmic transformation; β0 is an intercept and ɛt is a white noise error term.

The first step in the ARDL bounds testing approach is to estimate Equation (1) by ordinary least squares in order to test for existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged level variables, i.e., H0: β1 = β2 = 0 against the alternative H1: β1 ≠ β2 ≠ 0. Two sets of critical value bounds for the F-statistic are generated by Pesaran, et al. (2001). If the computed F-statistic falls below the lower bound critical value, the null hypothesis of no-cointegration cannot be rejected. Contrary, if the computed F-statistic lies above the upper bound critical value; the null hypothesis is rejected, implying that there is a long-run cointegration relationship amongst the variables in the model. Nevertheless, if the calculated value falls within the bounds, inference is inconclusive.

In the second step, once cointegration is established, the conditional ARDL long-run model for Gt can be estimated as:

$$InG_t = \beta_0 + \sum_{i=1}^{p} \beta_1 InG_{t-i} + \sum_{i=0}^{q} \beta_2 InT_{t-1} + \varepsilon_t \qquad \ldots (2)$$

where, all variables are previously defined. This involves selecting the orders of the ARDL (p, q) model using Schwarz Bayesian Criterion (SBC). In the third and final step, we obtain the short-run dynamic parameters by estimating an error correction model associated with the long-run estimates. This is specified as follows:

$$\Delta InG_t = \beta_0 + \sum_{i=1}^{p} \delta_1 \Delta InG_{t-i} + \sum_{i=0}^{q} \delta_2 \Delta InT_{t-1} + \varphi ECM_{t-1} + \varepsilon_t \quad \ldots (3)$$

where, δ1 and δ2 are the short-run dynamic coefficients of the model's convergence to equilibrium and φ is the speed of adjustment parameter and ECM is the error correction term that is derived from the estimated equilibrium relationship of Equation (1).

In this study, the annual time series data of the two variables under consideration, namely the Gross Domestic Product (GDP) and the official tourist receipts of Sri Lanka (both in US $ million), have been carried out from the year 1969 to 2009. The data on tourism receipts are collected from the annual statistical report of the Sri Lanka Tourist Board, and the Gross Domestic Product (GDP) of Sri Lanka are obtained from the International Financial Statistics CD-ROM, December, 2009.

IV. Empirical Results and Discussions

Before we proceed with the ARDL bounds test, we test for the stationarity status of the selected time series data to determine their order of integration. This is to ensure that the variables should not be stationary at an order of I(2) because the computed F-statistics provided by Pesaran, Shin and Smith (2001) are valid only when the variables are I(0) or I(1). Therefore, we conducted the Augmented Dickey-Fuller (ADF) test and its result is presented in Table 1. The unit root test results reveal that the tourism receipts and gross domestic product series are found to be integrated at an order of I(0) and I(1), respectively. Then, we employed Autoregressive Distributed Lag (ARDL) bounds testing approach to examine the impact of

tourism on economic growth in Sri Lanka. Table 2 presents the result of ARDL bounds test for the cointegration relationship based on equation (1). The appropriate lag length was selected on the basis of Schwarz Bayesian Criterion (SBC) for the conditional ARDL-UECM. The Table result reveals that the computed F-statistic is obviously greater than the upper bound critical value of 4.85 at the five per cent significant level. Thus, the null hypothesis of no cointegration is rejected, indicating there is a stable long-run cointegration relationship among the tourism and economic growth in Sri Lanka.

Table 1

Unit Root Test Results

Augmented Dickey-Fuller Test			
Variables	Intercept	Intercept & trend	Decision
lnT	-4.474*	-4.323*	I(0)
lnG	0.332	-2.676	-
⊿*lnT*	-	-	-
⊿*lnG*	-3.503**	-3.404***	I(1)

*, ** (***) – indicates significance at the one, five and ten per cent level, respectively. *G* and *T* are gross domestic product and tourism receipts, respectively. Optimal lag length is determined by the Schwarz Bayesian Criterion (SBC).
Source: Authors own computation.

Once the existence of cointegration relationship among the variables is confirmed, equation (2) was estimated for the long-run coefficients of the selected ARDL (1, 1) model based on the Schwarz Bayesian Criterion (SBC) and its results are presented in Table 2[4].

[4] The long-run estimates and their standard errors were obtained using Microfit 4.0. (Pesaran and Pesaran, 1997). This uses Bewley's (1979) regression method to estimate the asymptotic standard errors and is equivalent to the so-called 'delta' method (Greene, 1993, p. 297).

Table 2
Results of Bounds Test Approach to Cointegration

Computed F-Statistic: 4.934*	Critical Value	
	Lower Bound	Upper Bound
1% significance level	5.15	6.36
5% significance level	3.79	4.85
10% significance level	3.17	4.14

* indicates that computed statistic falls above the upper bonds value. The Bounds critical values are obtained from Pesaran, *et al.* (2001, pp. 300), Table: CI (iii) Case III: Unrestricted intercept and no trend (k=2).

The table result reveals that the estimated coefficient of tourism is positive and significant at one per cent level. It shows that in the long run, one percent increase in the tourism receipts leads to approximately 0.81 percent increase in the Gross Domestic Product (economic growth) all things being equal. This empirical evidence confirms that the tourism has a positive impact on economic growth in Sri Lanka in the long-run.

Table 3
Estimated Long-Run Coefficients Using the ARDL (1, 1) Approach

Dependent variable: lnG			
Variables	Coefficients	t-statistics	Prob. values
c	7.0100	11.530*	0.000
lnT	0.8112	4.1481*	0.000

* – indicates significance at one per cent level. *G* and *T* are gross domestic product and tourism receipts, respectively. Optimal lag length is determined by the Schwarz Bayesian Criterion (SBC).
Source: Authors own computation.

The results of short-run dynamic coefficients associated with the long-run relationships obtained from the ARDL-ECM equation (3) are

presented in Table 4. The optimal lag length for the selected error correction representation of the ARDL (1, 1) model is determined by the Schwarz Bayesian Criterion (SBC).

Table 4

Error Correction Representation for the Selected ARDL (1, 1) Model

Variables	Dependent variable: ΔlnG		
	Coefficients	t-statistics	Prob. values
c	0.17977	2.1403**	0.040
ΔlnT	0.04705	3.1936*	0.003
ECMt-1	-0.02564	-2.1589**	0.038
ECM = lnG -0.81120*lnT -7.0100*C			
R^2 = 0.3128		AIC = 100.71	
F-stat.(2, 34) = 7.5128 (0.002)		SBC = 97.489	
D-W statistic = 1.7661			
Short-run Diagnostic Tests			
Serial Correlation LM Test = 0.43437 (0.515)			
Heteroscedasticity Test = 1.4516 (0.236)			
Normality Test = 15.2073 (0.000)			
Ramsey RESET Test = 0.24116 (0.627)			

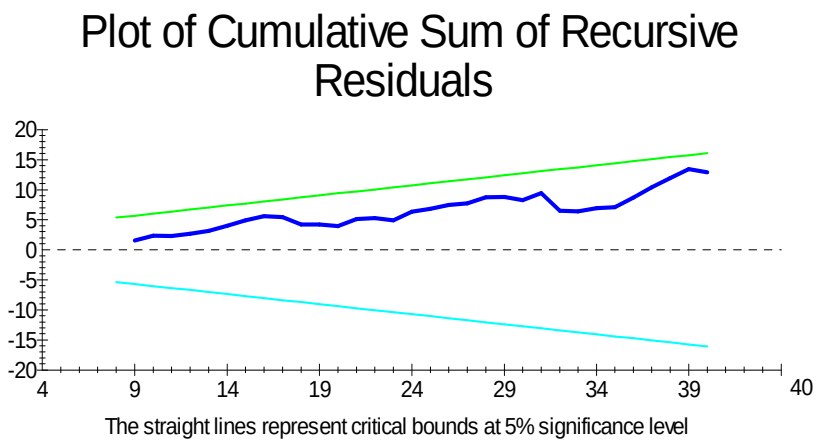
* (**) – indicates significance at one and five per cent level, respectively. *G* and *T* are gross domestic product and tourism receipts, respectively. Optimal lag length is determined by the Schwarz Bayesian Criterion (SBC).
Source: Authors own computation.

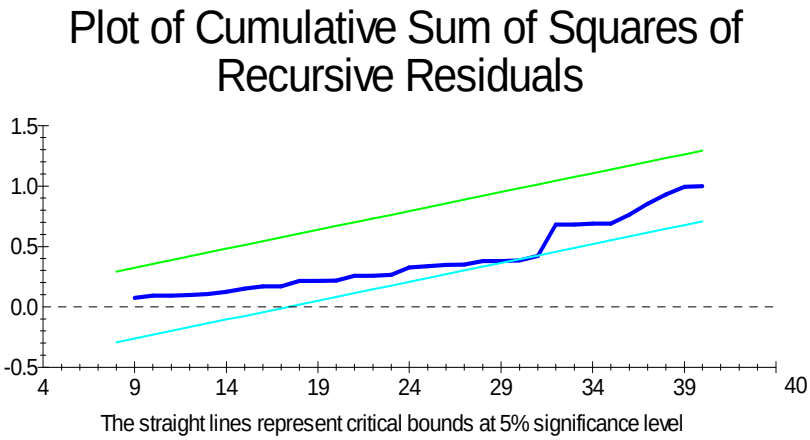
Table 4 result reveals that the estimated error correction coefficient is negative and significant at five per cent level ensuring that the adjustment process from the short-run deviation is quite slow. More precisely, it indicates that only 2 per cent of the disequilibrium in GDP from the previous period's shock will be converges back to the long-run equilibrium in the current period. The estimated coefficient of tourism is positive and significant at one per cent level. This implies that there is a statistically significant short-run positive impact of tourism on the economic growth in Sri Lanka.

Finally, the CUSUM and CUSUMSQ plots to check the stability of the long-run parameters together with the short-run movements for the ARDL-Error Correction Model are given in Figure 1. If the plots of the CUSUM and CUSUMSQ statistics stay within the critical bounds of five per cent level of significance, the null hypothesis of all coefficients in the given regression are stable and cannot be rejected.

Figure 1

Plot of CUSUM and CUSUMSQ (Stability Test)





Source: Authors own computation.

Examination of plots in Figure-1 shows that CUSUM and CUSUMSQ statistics are well within the 5% critical bounds implying that short run and long run coefficients in the ARDL-Error Correction Model are stable.

V. Conclusion

Autoregressive Distributed Lag (ARDL) bounds testing approach was employed to examine the impact of tourism on economic growth in Sri Lanka. By and large, our analysis reveals that the tourism has a positive impact on economic growth in Sri Lanka both in the short-run and long-run. However, the study results suggest that positive impact of tourism was extremely lower in the short-run compared to the long-run. This may be due to the fact that human rights violations, civil conflict and other politically motivated violent events influence the tourism arrivals in Sri Lanka in the short-run. Hence, it is crucial for the government to achieve unification and stability by focusing on

political solutions to a sustainable long-term conflict resolution in order to attract more tourism arrivals and thereby the Sri Lanka can enhance its economic growth.

References

1. Aslan, A. (2008), "Türkiye'de Ekonomik Büyüme ve Turizm İlişkisi Üzerine Ekonometrik Analiz", *Erciyes Üniversitesi SBE Dergisi*, 24: 1-11.
2. Balaguer, J. and Cantavella-Jorda, M. (2002), "Tourism as a long-run economic growth factor: The Spanish case", *Applied Economics*, 34: 877–884.
3. Bewley, R. A. (1979), "The Direct Estimation of the Equilibrium Response in a Linear Model", *Economics Letters*, 3: 357-361.
4. Dritsakis, N. (2004), "Tourism as a Long-run Economic Growth Factor, An Empirical Investigation for Greece", *Tourism Economics*, 10: 305-316.
5. Engle, R. F. and Granger, C.W.J. (1987), "Cointegration and Error-Correction, Representation, Estimation, and Testing", *Econometrica*, 55: 251-276.
6. Gamage, A. (1978), "Tourism in the Economy of Sri Lanka", *Unpublished Masters Thesis*, Scottish Hotel School.
7. Greene, W. H. (1993), "*Econometric Analysis*", New York: Macmillan.
8. Gündüz, L. and Hatemi-J, A. (2005), "Is the tourism-led growth hypothesis valid for Turkey?", *Applied Economics Letters*, 12: 499-504.
9. Harris, R. and Sollis, R. (2003), "*Applied Time Series Modelling and Forecasting*", West Sussex: Wiley.
10. Hazari, B. R. and Sgro, P. M. (1995), "Tourism and Growth in a Dynamic Model of Trade", *Journal of International and Economic Development*, 4: 243-252.

11. Ihalanayake, R. (1996), "Assessing the economic impact of international tourism in Sri Lanka", *Unpublished Masters Thesis*, Victoria University.
12. Inder, B. (1993), "Estimating Long-Run Relationships in Economics, A Comparison of Different Approaches", *Journal of Econometrics*, 57: 53-68.
13. Johansen, S. (1988), "Statistical Analysis and Cointegrating Vectors", *Journal of Economic Dynamics and Control*, 12: 231-254.
14. Johansen, S. and Juselius, K. (1990), "Maximum likelihood estimation and inference on cointegration, with applications to the demand for money", *Oxford Bulletin of Economics and Statistics*, 52: 169-210.
15. Kasman, A. and Kasman, S. K. (2004), "Cointegration and causality between tourism revenues and economic growth", *İktisat İşletme ve Finans*, 19: 122-131.
16. King, B. E. M. and Gamage, A. (1994), "Maximizing the Value of the Ethnic Connection, Expatriate Travelers from Australia to Sri Lanka", *Journal of Travel Research*, 33: 46-52.
17. Narayan, P. K. and Smyth, R. (2005), "Electricity Consumption, Employment and Real Income in Australia, Evidence From Multivariate Granger Causality Tests", *Energy Policy*, 33: 1109-1116.
18. Odhiambo, N. M. (2009), "Energy Consumption and Economic Growth in Tanzania, An ARDL Bounds Testing Approach", *Energy Policy*, 37: 617-622.
19. Pesaran, M. H. and Y. Shin (1999), "*An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis*", in Storm, S. (Ed), "Econometrics and Economic Theory in the 20th Century", The Ragnar Frish Centennial Symposium, Cambridge University Press.

20. Pesaran, M. H., Y. Shin and R. J. Smith (2001), "Bound Testing Approaches to the Analysis of Level Relationships", *Journal of Applied Econometrics*, 16: 289-326.
21. Peseran, M. H. and B. Peseran (1997), "*Working with Microfit 4.0*", Interactive Econometric Analysis: Oxford University Press.
22. Roe, D., Ashley, C., Page, S., and Meyer, D. (2004), "Tourism and the poor, Analysing and interpreting tourism statistics from a poverty perspective", *Pro-Poor Working Paper*, ODI, London, UK.
23. Sharpley, R. (2000), "Tourism and sustainable development, Exploring the theoretical divide", *Journal of Sustainable Development*, 8: 1-19.
24. Wickremasinghe, G. B. and Ihalanayake, R. (2006), "The Causal Relationship between Tourism and Economic Growth in Sri Lanka, Some Empirical Evidence", *Working paper Series No. 2006.10*, School of Applied Economics, Victoria University.
25. Yavuz, N. (2006), "Türkiye'de Turizm Gelirlerinin Ekonomik Büyümeye Etkisinin Testi, Yapisal Kirilma ve Nedensellik Analizi", *Journal of Doğus University*, 7: 162-171.
26. Yildirim, J. and Öcal, N. (2004), "Tourism and Economic Growth in Turkey", *Ekonomik Yaklasım*, 15: 131-141.
27. Zortuk, M. (2009), "Economic Impact of Tourism on Turkey's Economy, Evidence from Cointegration Tests", *International Research Journal of Finance and Economics*, 25: 231-239.