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Inter-temporal Relationship between Tourism Demand and Tourism Employment (A NARDL co-integration approach for Sri Lanka)

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Article Information

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Abstract

The aim of this study is to investigate the inter-temporal relationship between tourism demand and tourism employment in Sri Lanka over the period of 1970-2018 using time series data. In order to attain the objective, this study uses the nonlinear autoregressive distributed lag (NARDL) Bounds cointegration technique. The cointegration test results illustrate that there exists an asymmetric cointegration relationship between the variables. The NARDL technique finds that if the international tourism demand increases by 1000 people, 157 and 113 people will get the tourism-related total employment opportunity in the long-run and the short-run, respectively. Further, it confirms that if the tourism demand decreases by 1000 people, 45 and 43 people will lose tourism-related employment in the long-run and the short-run, respectively. These findings are empirically important in these days because of spreading the COVID 19 pandemic in Sri Lanka.

Introduction

Due to the world economic depression of 1930, the emerging countries had started to change their economic structure from tangible to intangible production path. In which, tourism is one of the intangible paths, which has been recently identified (Skerritt & Huybers, 2005). However, since the end of World War II, tourism significantly contributes to global economic development. Most countries believe that tourism is a leading driver for economic development (Rasul & Manandhar, 2009). The recent literature on the consequences of tourism point out that tourism is a good medicine for reducing the unemployment issues of developing countries (Skerritt & Huybers, 2005; Manzoor, et.al. 2019). The tourism sector remains an important source for the generation of employment and income in formal and informal sectors (Malik etal., 2010). However, there are a number of shocks in the tourism sector that have been generated by a number of external sources. In which, the International Monetary Fund recently has identified the COVID 19 pandemic as an important external shock.

The world travel and tourism council (WTTC) reports that the tourism sector had newly created 123 million direct jobs in 2018 which expected as 154 million by 2029 with an annual growth rate of 2.1 percent. Furthermore, it states that the total job creation by the tourism sector was 318 million in 2018, which will rise to 421 by the year 2029. By exchanging better communication and transport facilities, globalization process is more influence on tourism. Each country in the world follows different strategies in attracting middle-class tourists to increase micro level earnings of foreign exchange.

Owing to these reasons, the tourism sector as stated above is continuously viewed as a key driver of economic development and also a generator of tourism-related employment. It is, therefore, viewed that the tourism sector is an inseparable part of the economic development of a country.

As Sri Lanka is an island and the eternal nation of the Indian Ocean, it plays an important role in attracting a large number of tourists. Sri Lanka's tourist attractions have been religiously and culturally important since prehistoric periods (Aslam, 2016). Thereby, the total tourism demand in Sri Lanka continuously shows an increasing trend. For this reason, Sri Lanka established the Cylon Tourist Bureau (CTB) in 1966 to regularize the tourism sector. After that, total tourism demand in Sri Lanka was systemized. In 1966, total tourism demand in Sri Lanka was 18960 which suddenly grew up to 407230 in 1982. However, between the years of 1981 and 1987, the total tourism demand declined to 182620 due to ethnic conflict in Sri Lanka. Therefore, Sri Lanka lost a number of benefits from the tourism sector during the ethnic conflict period. However, having ended the ethnic conflict in 2009, Sri Lanka started to feel a bright future in the entire fields. Since then, the tourism sector in Sri Lanka is significantly contributed to the Sri Lankan economy. In 2009, the total tourism demand was 447890 which increased to 2333796 in 2018. On the other hand, the tourism sector in Sri Lanka produced 124960 tourism-related employment in 2009 which increased to 3884887 in 2018. However, the Sri Lanka Tourism Development Authority (SLTDA) reports that Sri Lanka has lost 319 USD million tourism income and 0.5 million jobs in the first quarter of 2020 due to the COVID19 pandemic. As well, 17.7 percent of total tourism demand was declined in February 2020 compared to the previous months. Further, SLTDA expects that at least three years need to recover losses of total tourism demand. Therefore, the main inspiration of this study is to answer the research question of whether total tourism demand in Sri Lanka affects tourism-related employments. In order to do that, this study forms the following objective. The objective of this study is to investigate the inter-

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temporal relationship between total tourism demand and tourism-related employment in Sri Lanka.

The rest of the study is structured as follows. 2nd section provides the review of literature. The research methods are delineated in 3rd section. 4th section presnts the results and discussion. Final section concludes this study with policy implications.

Review of literature

There is sufficient literature that has investigated the empirical relationship between tourism and other variables using a number of Econometric techniques based on single and cross-country data. However, only a few studies focus on the relationship between tourism demand and tourism-related employment. In light of this, Sathiendrakumar & Tisdell (1989) state that the tourism sector is providing job facilities to the public. Pavlic *et al*. (2013) conclude that tourism has a positive effect on tourism-related employment. Manzoor *et al.* (2019) state that tourism promotes tourism-related employment. Ramesh (2002) concludes that tourism augments tourism-related employment. Modeste (1995) concludes that there is a long-run positive relationship between tourism demand and tourism-related employment. Mishra et al. (2011) confirm that most of the tourism-related employment are induced by tourism demand.

Selvanathan (2007) examines the effect of war and other factors on tourism in Sri Lanka. This study states that tourism-related employment is subjected to tourism demand. Ahmed (1986) finds that tourism demand generates tourism-related employment. Robinson & Jarvie (2008) conclude that tourism demand in Sri Lanka promotes seasonal employment. Jolliffe & Aslam (2009) state that tourism in Sri Lanka is one of the drivers for diminishing unemployment issues. Ohare & Barrett (1994) conclude that the tourism demand is an important factor in generating employment. Irudeen & Samaraweera (2013) find that tourism demand promotes tourism-related employment. Fernando *et.al.* (2013) conclude that the tourism sector augments tourism-related employment in Sri Lanka. Buultjens *et al.* (2005) discover that tourism demand creates tourism-related employment in Sri Lanka. From the review of literature, it is obviously highlighted that none of the literature in Sri Lanka found what extent positive and negative shocks in the tourism demand affects tourism-related employment. Therefore, it is being a research gap between tourism demand and tourism-related jobs in Sri Lanka.

Research Methods

Data and empirical model

This study uses annual time series data to anlysis the objective of this study for the period 1970-2018. The data have been collected from the official website of the Sri Lanka Tourism Development Authority (SLTDA,2019). Data for variables such as tourism demand (TD) and tourism-related total employment (TTE) were used in this study to achieve the objective. The mathematical function of this study as follows:

$$TTE_t = f(TD_t) \quad (1)$$

where TTE_t presents the tourism-related total employeemnt, and TD_t is total tourism demand which indicates the quantitiy of tourists' arrivals.

From the mathematical function (1), the empirical model of this study can be written as follows:

$$TTRE_t = \vartheta_0 + \theta_i TD_t + \xi_t \quad (2)$$

Where ϑ_0 is constant, θ_i is the coefficient of tourism demand, and ξ_t is error term.

For investigating the asymmetric effect of tourism demand on tourism-related total employment, the dependent variable of tourism demand is decomposed as positive and negative changes. Thus, the empirical model given in (2) including decomposed variables can be written as follows:

$$TTRE_t = \vartheta_0 + \theta_1^+ TD_t^+ + \theta_2^- TD_t^- + \xi(t) \quad (3)$$

where TD_t^+ is the positive changes in the tourism demand, TD_t^- is the negative changes in the tourism demand, ϑ_1 and ϑ_2 are the long-run coefficients of both positive and negative changes in the tourism demand respectively. Further, $TD_t = TD_0 + TD_t^+ + TD_t^-$ (TD_0 is initial value of total tourists' arrivals).

The partial sum of decomposition of positive(TD_t^+) and negative changes(TD_t^-) in tourism demand was calculated by using the following equations, respectively as;

$$TD_t^+ = \sum_{j=1}^{q} \Delta TD_j^+ = \sum_{j=1}^{q} \max(\Delta TD_j, 0) \quad (4)$$

$$TD_t^- = \sum_{j=1}^{q} \Delta TD_j^- = \sum_{j=1}^{q} \min(\Delta TD_j, 0) \quad (5)$$

Analitcal Technique

The descriptive and inferential techniques are employed to analyse the data used in this study. In the descriptive analysis, the bar chart, the scatter plot, confidence ellipse with kernel fit were used to find useful information on the relationship between the variables used in this study. This analysis may catch uncover the underlying structure of the relationship between the variables. As well, in the inferential techniques, the following tests: BDS test, unit root, and nonlinear autoregressive distributed lag (NARDL) Bounds cointegration technique were employed.

To detect the serial dependence of time series, the BDS test was employed which was proposed by Broock,*et al.* (1996). In this test, the null hypothesis that the time series is independent and identically distributed was tested against the alternative hypothesis that time series is not independent and identically distributed. If the BDS test statistic was statistically significant, the null hypothesis would be rejected. The BDS test equation can be written as follows:

$$BDS_{\varepsilon,m} = \frac{\sqrt{N}[C_{\varepsilon,m} - (C_{\varepsilon,1})^m]}{\sqrt{V_{\varepsilon,m}}} \quad (6)$$

where $C_{\varepsilon,m} = \frac{1}{N_m(N_m-1)} \sum_{i \neq j} I_{i,j,\varepsilon}$; $V_{\varepsilon,m}$ is the standard deviation of $\sqrt{N}[C_{\varepsilon,m} - (C_{\varepsilon,1})^m]$

It is necessary to know the order of integration for the time series variables before starting the estimation procedure of time series (Aslam & Sivarajasingham,2020a; Aslam & Sivarajasingham,2020b; Aslam & Sivarajasingham,2020c). In order to test the order of integration of the variables, this study used the Augmented Dickey-Fuller (ADF) and Kwiatkowski- Phillips- Schmidt- Shin (KPSS) unit root tests. The reason for using the unit root test is to confirm that the variables used in this study were not in *I*(2) or higher-order.

The ADF test equation is as:

$$\Delta y_t = \beta' D_t + \pi y_{t-1} + \sum_{j=1}^{p} \varphi_j \Delta y_{t-j} + e_t \quad (7)$$

where $\pi = \phi - 1$

The null hypothesis of ADF unit root test is that the series y_t is *I(1)*.

The KPSS test equation is as:

$$KPSS = \left(T^{-2} \sum_{t=1}^{T} \hat{S}_t^2\right) \Big/ \hat{\lambda}^2 \quad (8)$$

where $\hat{S}_t = \sum_{j=1}^{t} \hat{U}_j$, $\hat{\lambda}^2$ is constant.

The null hypothesis of KPSS unit root test is that the series y_t is *I(0)*.

This study used the nonlinear autoregressive distributed lag (NARDL) Bounds cointegration technique to examine the asymmetric effect of tourism demand on tourism-related employment in Sri Lanka. The NARDL Bounds cointegration technique was developed by Shin,*et al.* (2014) which was established based on the autoregressive distributed lag (ARDL) Bounds technique proposed by Pesaran,*et al.* (2001). The NARDL technique is commonly used to find the asymmetric effect (Positive and Negative shocks) of an explanatory variable on the explained variable in the long and short-run. Similar to the ARDL Bounds cointegration technique, the NARDL technique has also some advantages such as, (a) the NARDL technique is applied to the small sample (Dhaoui & Bacha, 2017); (b) the NARDL admits the mixed order variable, but does not allow *I*(2) or higher-order variables (Romilly,*etal.*,2001).

The NARDL model specification of this study can be written as follows:

$$\Delta \mathrm{TTE}(t) = \beta_0 + \sum_{i=1}^{p_{1i}} \rho_{1i} \Delta \mathrm{TTE}_{t-i} + \sum_{i=0}^{p_{2i}} \phi_{2i}^+ \Delta TD_{t-i}^+ + \sum_{i=0}^{p_{3i}} \phi_{3i}^- \Delta TD_{t-i}^- + \mu TTE_{t-1} + \zeta^+ TD_{t-1}^+ + \zeta^- TD_{t-1}^- + \varepsilon_t \quad (9)$$

where $p_{1i} - p_{3i}$ is lag order, the coefficients connected with long-run parameters of TD_t^+ and TD_t^- given in Equation (3) are calculated as $\theta_1^+ = \left(-\zeta^+/\mu\right)$; and $\theta_2^- = \left(-\zeta^-/\mu\right)$; $\sum_{i=0}^{p_{2i}} \phi_{2i}^+$ and $\sum_{i=0}^{p_{3i}} \phi_{3i}^-$ represent the short-run positive and negative coefficient of the total tourists' arrival, respectively.

Bahmani *et al.* (2019) state that the estimation procedure of NARDL is similar to ARDL technique. Accordingly, the NARDL estimation steps are: (1) the linear dependency of the variables have to be tested by using the BDS test; (2) the orders of integration of variables are verified by using the appropriate unit root test; (3) the appropriate lag length is selected using suitable lag length criterion; (4) the unrestricted error correction NARDL is estimated by using the OLS regression technique; (5) the cointegration relationship among the variables is tested by using the t-test (t_{BDM}) proposed by Banerjee, *et al.*,(1998) and F-test (F_{PSS}) proposed by Pesaran*et.al.*, (2001).

Based on the t-test, the null-hypothesis is that there is no long-run relationship ($\mu = 0$) was tested against the alternative hypothesis of $\mu < 0$. Based on the F-test, the joint null hypothesis is that there is no long-run relationship ($\mu = \zeta^+ = \zeta^- = 0$) was tested against the alternative hypothesis of $\mu \neq \zeta^+ \neq \zeta^- \neq 0$. The decision of the t-test was taken by using the calculated t-value with the critical value of t_{BDM} proposed by Banerjee *et.al.* (1998). However, the decision of the F-test was taken based on the calculated F-value comparing with the critical values of F_{PSS} proposed by Pesaran *et.al* (2001). If the estimated $|t - value|$ was greater than the critical value of $|t_{BDM}|$ at 5 percent significance level, the null hypothesis would be rejected. If the estimated F-value was greater than upper bound critical of F_{PSS} at 5 significance level, the null hypothesis would be rejected.

The NARDL Bounds cointegration technique acknowledges three asymmetry forms: (i) Long-run or reaction asymmetry which is associated with the asymmetric long-run coefficients ($\theta_1^+ \neq \theta_2^-$); (ii) impact asymmetry which is related with the inequality of the short-run coefficients $\left(\sum_{i=0}^{p_{2i}} \phi_{2i}^+ \neq \sum_{i=0}^{p_{3i}} \phi_{3i}^- \, or \, \phi^+ \neq \phi^-\right)$on the contemporary first difference of ΔTD_{t-i}^+ and ΔTDA_{t-i}^-; (iii) adjustment asymmetry which is captured by the patterns of dynamic adjustment from the initial equilibrium to the new equilibrium following an economic alarm (i.e. the dynamic multiplier). Further, the dynamic adjustment patterns depended on the model specification. Adjustment asymmetry derived from the interaction of impact and reaction asymmetries in conjunction with the error correction coefficient μ (Shin *et. al*, 2014). Therefore, the null hypothesis that there is a long-run symmetry between positive and negative changes in the tourism demand ($\theta_2^+ = \theta_3^-$) and the null hypothesis of short-run symmetry that there is a short-run asymmetry between positive and negative changes in the tourism demand $\left(\sum_{i=0}^{p_{2i}} \phi_{2i}^+ = \sum_{i=0}^{p_{3i}} \phi_{3i}^- \, or \, \phi^+ = \phi^-\right)$ was tested by using the standard Wald test.

If the Wald test statistic is not significant, the null hypothesis will be accepted meaning that the coefficients are symmetry (no difference), otherwise, if the Wald test statistic is significant, the null hypothesis is to be rejected meaning that the coefficients are asymmetry (different from each other). In addition to the long-run and short-run symmetric tests, Adjustment asymmetry (the derivation of positive and negative shock multipliers associated with TD_{t-i}^+ and TD_{t-i}^- has been addressed by the following Equations as:

$$m_h^+ = \sum_{j=0}^{hj} \frac{\partial TD(t+j)}{\partial TD_{t-i}^+} = \sum_{j=0}^{hj} \lambda_j^+ \;\; (h = 0,1,2, \dots.) \qquad (8)$$

$$m_h^- = \sum_{j=0}^{hj} \frac{\partial TD(t+j)}{\partial TD_{t-i}^-} = \sum_{j=0}^{hj} \lambda_j^- \;\; (h = 0,1,2, \dots.) \qquad (9)$$

In the case of this study, $\sum_{j=0}^{hj} \lambda_j^+ \; (h = 0,1,2, \dots.)$ was reorganized as $\sum_{i=0}^{p_{2i}} \phi^+ \, (p_{2i} = 0,1,2, \dots.)$, respectively. As well, $\sum_{j=0}^{hj} \lambda_j^- \; (h = 0,1,2, \dots.)$ was simplified as $\sum_{i=0}^{p_{3i}} \phi^- (p_{3i} = 0,1,2, \dots.)$. Further, $h \to \infty$, $m_h^+ \to \theta_1^+$, $m_h^- \to \theta_2^-$ where $\theta_1^+ = \left(-\zeta^+/\mu\right)$ and $\theta_2^- = \left(-\zeta^-/\mu\right)$ were the asymmetric long-run coefficients. m_h^+ and m_h^- summarized the dynamic adjustment pattern which should generally be symmetric and they present the crucial information responsible for the volatility.

To check the robustness of the estimated NARDL model, this study employed the Breusch -Godfrey serial correlation LM test, Heteroskedasticity ARCH test, Jerque-Berra normality test, and the CUSUM plot.

Results and discussion

Figure 1 and Figure 2 show the trend of tourism demand and tourism-related employment respectively which confirm that tourism demand and tourism-related employment have an exponentially increasing trend with time in Sri Lanka.

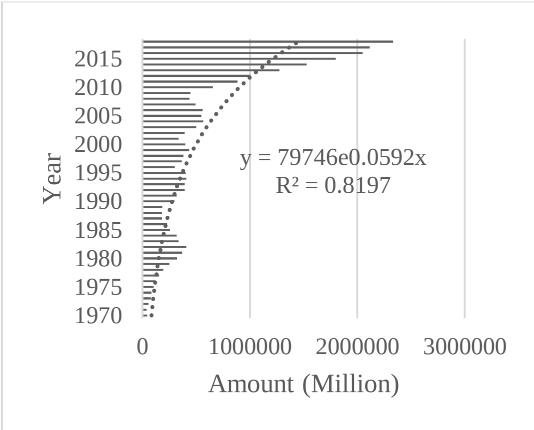

Figure 1. Trend of tourism demand in Sri Lanka (1970-2018)
Source: Excel software

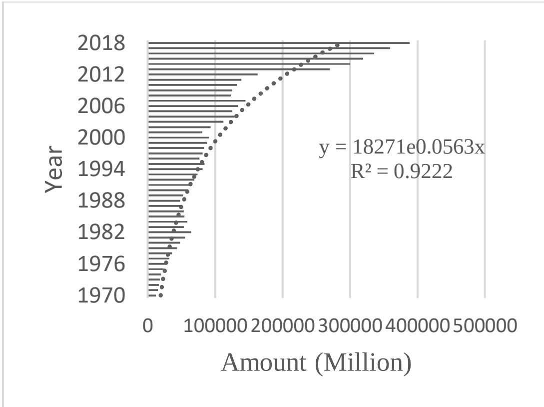

Figure 2. Tourism-related employment in Sri Lanka (1970-2018)
Source: Excel software

In order to confirm the relationship between tourism demand and tourism-related employment in Sri Lanka, the scatter plots, the Confidence Ellipse with Kernel Fit is used. Figure 3 shows the relationship between tourism demand and tourism-related total employment in Sri Lanka which highlights that the tourism demand has a positive relationship with tourism-related total employment at 95 percent confidence level in Sri Lanka.

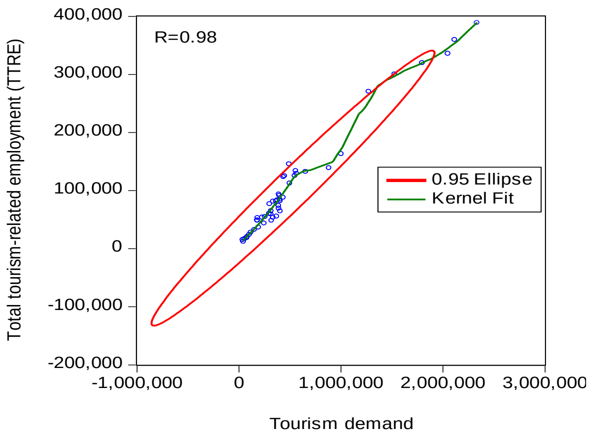

Figure 3. Association between TD and TTE in Sri Lanka
Source: E-views software

The BDS test results of the variables used in this study are presented in Table 1, which shows that the calculated BDS test statistics for each variable is significant at 1 percent level as the corresponding p-value of each variable less than 0.01. Hence, the null hypothesis that the series is independent and identically distributed is rejected. Therefore, this study proposes the nonlinear model as the series is not independent and identically distributed.

Table 1. BDS Test

Variable	BDS test statistic (Embedding dimension)					p-value
	2	3	4	5	6	
TTE	0.161410	0.249921	0.289031	0.290582	0.261137	0.0000*
TD	0.159291	0.244663	0.281350	0.283778	0.248235	0.0000*

Source: E-views software
*p<0.01

Table 2 shows the unit root test results of the variables used in this study, which indicates that the variables are not stationary at level, $I(1)$, and the variables are not in$I(2)$ or higher order.

Table 2. Unit Root Test

Variable	ADF test (Intercept)		KPSS test (Intercept)		Decision
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	
TTE	3.1490	-4.3604*	0.7484	0.4536	$I(1)$
TD	1.8593	-2.7036**	0.6612	0.4390	$I(1)$

Source: E-views software
*p<0.05 **p<0.1

Ng & Perron (2001) state that the determination of optimal lag-length is an important prerequisite for getting meaningful cointegration results. Therefore, lag 2 under the Schwarz criterion is considered to select the appropriate NARDL model for this study. There are 20 $NARDL\ (p_1, p_2, p_3)$ models that have been produced under lag 2. In which the $NARDL$ (2,2,0) model has the lowest value than other NARDL models. Thus, this study selects the $NARDL$ (2,2,0)model. Therefore, the cointegration test results under the $NARDL$ (2,2,0) model are presented in Table 3. In this table, the first panel shows the test result of calculated *F*- statistic with critical values at a different significance level, which reveals that results the calculated *F*-statistic is greater than the upper bound critical value at 5 percent significance level. The second panel shows the *t*-test results which indicate that the absolute value of estimated t-statistic is greater than the critical value at 5 percent significance level. As the calculated *F* and *t*-statistics are greater than 5 percent significance level, it can be concluded that the variables used in this study are cointegrated with each other.

Table 3. NARDL Cointegration Bounds Test

$F-statistic$			$t-statistic$	
$K: 1$	F_{PSS}= 13.07		$K: 1$	$t_{BDM} = (-4.05)$
Significance	I(0) Bound	I(1) Bound	Significance	Critical value I(1)
10%	4.19	5.06	10%	-3.44
5%	4.87	5.85	5%	-3.78
2.5%	5.79	6.59	2.5%	-2.92
1%	6.34	7.52	1%	-4.48

Source: E-views software

The test results of the long-run and short-run symmetry of coefficients for positive and negative changes in tourism demand based on the Wald test are presented in Table 4. The null hypothesis that the long-run and the short-run coefficients of positive and negative changes in tourism demand are symmetry is rejected due to the significance of corresponding p-values. Therefore, the coefficients of positive and negative changes in tourism demand show asymmetric behaviour in the long-run and the short-run.

Table 4. Symmetry Test

Wald test	*F*-statistic	*p*-value
W_{LR}	4.2046	0.046**
W_{SR}	3.3370	0.075***

Note: W_{LR} is long-run asymmetry; W_{SR} is short-run asymmetry
Source: E-views software
**p<0.05 *** p<0.1

The long-run coefficients of positive and negative changes in tourism demand in Sri Lanka are given in Table 5, which indicates that the positive long-run coefficient's value (θ_1^+) and the negative long-run coefficient's value (θ_1^-) are 0.157 and 0.045 respectively. The positive long-run coefficient of tourism demand implies that tourism-related employment can give to 157 people by allowing 1000 tourism demand, whereas the negative long-run coefficient of tourism demand indicates that 45 people will lose their tourism-related employments if tourism demand decreases by 1000 people. Based on the findings, it is confirmed that a negative shock in the tourism demand reduces tourism-related total employment.

Table 5: Long-run asymmetric effect of variable

Variable	Coefficient	t-statistic	p-value
TD_t^+	0.157	20.284	0.000*
TD_t^-	0.045	0.898	0.037**
C	15214.070	2.0578	0.000*

Source: E-views software
*p<0.01 **p<0.05

Table 6 shows the short-run asymmetric coefficients of tourism demand in Sri Lanka. The coefficient of ΔTD_t^+ is 0.113. On the other hand, the negative change in tourism demand in the short-run is not significant, which is theoretically acceptable in the short-run period because any negative changes do not immediately influence tourism-related employment. In the meantime, the positive changes in the tourism demand in the short-run indicate that 113 tourism-related jobs can be instantly created by allowing 1000 tourists into Sri Lanka.

Table 6: Short-run asymmetric effect of variable

Variable	Coefficient	t-statistic	p-value
ΔTD_t^+	0.113	4.028	0.000*
ΔTD_t^-	0.043	0.916	0.347^{ns}

Source: E-views software
*p<0.01 ^{ns}: not significant

Adjustment pattern of tourism employments to unitary changes of the total tourism demand in Sri Lanka is shown in Figure 4, which indicates that the positive shock in tourism demand is significant and more domineering on total tourism-related employment in Sri Lanka. However, the short-run disequilibrium is adjusted roughly after the 9th year (see Figure 4).

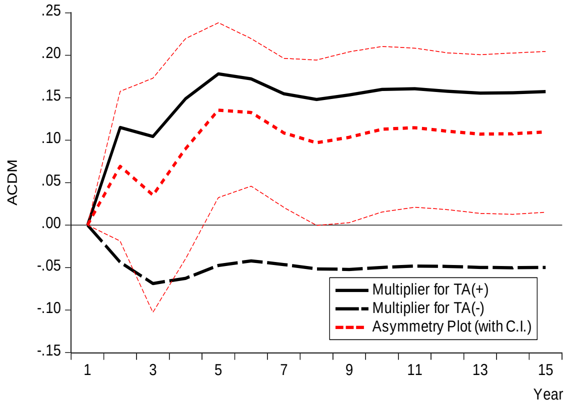

Figure 4. Dynamic Adjustment Multiplier
Source: E-views software

The diagnostic test results of the Breusch–Godfrey serial correlation LM test, Heteroskedasticity ARCH test, and Jerque-Berra normality test are presented in Table 7. The null hypothesis that there is no serial correlation is not rejected as the corresponding p-value of the Breusch –Godfrey serial correlation LM test is greater than at 5 percent significance level, whereas the null hypothesis that the estimated model is homoscedasticity is also not rejected as the corresponding p-value of heteroskedasticity ARCH test is greater than at 5 percent significance level. Furthermore, the null hypothesis that the residuals are normally distributed is accepted as the corresponding p-value of Jerque Bra normality test is higher than at 5 percent significance level.

Table 7: Diagnostic tests result

Model	Test statistic			
	Breusch-Godfrey Serial Correlation LM Test		Heteroskedasticity ARCH Test:	
	F- statistic	Prob. F (2,36)	F- Statistic	Prob. F (1, 23)
NARDL (2, 2, 0)	1.0704	0.3535	0.2934	0.5908
J-B test statistic		χ^2 40.675		p-value 0.8508

Source: E-views software

As stated in research methods, Figure 5 shows the CUSUM plot which is used to test the parameters' stability of the estimated $NARDL\ (2,2,0)$ model. As the CUSUM line in Figure 5 lies between the critical lines, the parameters of the estimated NARDL model is stable at 5 percent significance level.

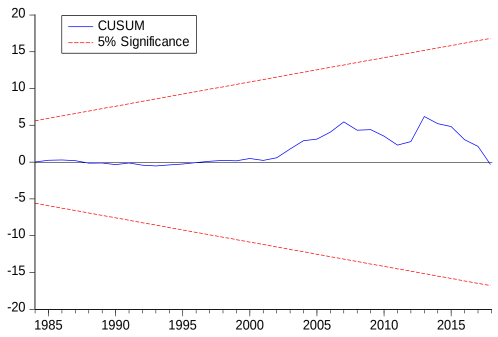

Figure 5. The CUSUM plot
Source: E-views software

Conclusion

This study has examined the asymmetric effect of tourism demand on tourism-related employment in Sri Lanka using nonlinear autoregressive distributed lag (NARDL) Bounds technique over the period of 1970 – 2018. The ADF and KPSS unit root test results indicated that the variables used in this study were stationary at 1st difference. The BDS test results specified that the variables used in this study were not independent and identically distributed. The Bounds test results based on F-statistic and t-statistic confirmed that there existed the long-run relationship between the variables of tourism demand and tourism-related employment. Further, the Wald test authenticated that the positive and negative changes in tourism demand were not the symmetry in the long-run and the short-run. The NARDL Bounds test results predicted that the positive changes in tourism demand produced tourism-related- jobs whereas the negative change in tourism demand decreased tourism-related jobs in Sri Lanka. The dynamic multiplier indicated that the positive changes in the tourism demand more dominated the tourism-related jobs in Sri Lanka. Therefore, this study recommends that tourism development policymakers should develop tourist promotion policies to reduce the forthcoming unemployment and economic development issues in Sri Lanka due to COVID 19.

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