Journal of **B**usiness **E**conomics
ISSN 2682- 6933 | E-ISSN 2705-9944
2020 Volume 02 Issue 2:92-98

CAUSALITY BETWEEN EXCHANGE RATE AND TOURISM: EMPIRICAL EVIDENCE FROM SRI LANKA

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Abstract

The key objective of the study is to investigate the causal relationship between exchange rate and tourism. The exchange rate was considered an indicator of Sri Lankan rupees to one U.S dollar, and tourism was considered total tourist arrivals. This research paper used quarterly time-series data obtained from the first Quarter of 1973 to the first quarter of 2021. Minitab-17 and E-views-10 software were used for the data analysis. Econometric tests such as Augmented Dickey-Fuller (ADF) for unit root test, Granger test under a VAR context for causality were applied to understand the relationship between tourism and Exchange rate. Our results reveal that there is two-way causality between exchange rate and tourism. Therefore, we suggest, the government and policymakers maintain stability in the exchange rate.

Keyword: Causality, VAR, Exchange rate, Tourism, Sri Lanka

1. Introduction

Tourism is one of the most essential earning sectors in Sri Lanka. It has been generating employment in formal and informal sectors (Mahmoudinia et al., 2011). After the open economy, the Sri Lankan government focuses gradual development of this sector. However, After the war came to an end in 2009, total tourist arrivals were sharply increased. In 2018, it reached the highest value of 2,521,000 (World Bank, 2021). Global recognized company Lonely Planet named Sri Lanka as the number-one travel destination for 2019.

Although political upheaval late in 2019, the number of tourists coming to the island increased by 10% to 2.3 million. In comparison, growth across the Asia Pacific was 6%. South-east Asia, in particular, grew at 7%, Northeast Asia at 6%, and South Asia at 5% (UNWTO, 2019). However, Sri Lanka had trouble archive the target 2.5 million arrivals in 2018. The UNWTO estimates substantial outbound travel from emerging markets in 2019. Sri Lanka's core source market of India places high on this list, and some more small Asian, Arab countries, and Russia, also expected to be considered sources of international travelers.

In 2019, the travel and tourism of Sri Lanka's GDP was 12.6%. Its contribution to Sri Lanka's GDP increased from 6% in 2000 to 12.6% in 2019, rising to an average annual rate of 4.28% (Knoema, 2019). Unlike most of the rest of the economy, depreciation of the rupee could benefit the sector. Generally, Hotels earn significant income in dollars. This situation creates Sri Lanka a more competitively prices terminus for travelers paying in dollars (oxford business group, 2019).

In January 2019, John Amaratunga, minister of tourism development, wildlife, and Christian religious affairs, told the local media, he was confident the tourism sector would become the country's second-highest foreign exchange earner by the end of 2019 (xinhuanet.com, 2019). The industry is currently placed third, after textiles and remittances from abroad. The tourism sector has contributed to generating foreign exchange to Sri Lanka (Guneratne, 2007). Sri Lankan rupees to one U.S dollar were increased from 1977 to till. This change introduces an open economy in Sri Lanka (World Bank, 2021). The exchange rate of Sri Lanka with the other regions are the instrumental signal for attracting tourists into Sri

Lanka. The changes in the value of exchange rates significantly affect the number of tourists attracted to Sri Lanka (Nisthar and Nufile, 2019).

2. Literature Review

Many researchers widely analyze this topic. Kilic and Bayar (2014) explored the relationship between real effective exchange rate volatility and tourism receipts and expenditure in Turkey between 1994 and 2013. Volatility in the real effective exchange rate was found with a generalized autoregressive conditional heteroscedasticity (1,1) model. Johansen cointegration test and pairwise Granger causality were used to finding the relationship between them. There is a positive long-term relationship between the real effective exchange rate and tourism receipts and expenditures.

Cheng et al. (2013) investigate exchange rate effects on U.S. tourism trade in structural vector autoregressive models. They used quarterly data from 1973 to 2007. The results illustrate that depreciation increases the U.S. tourism trade balance with a unit return after six quarters. Only export earnings are somewhat sensitive to the exchange rate. Agiomirgianakis et al. (2015) examined the exchange rate fluctuations (ERV) for Iceland in tourist exports from the first quarter of 1990 to the fourth quarter of 2014. In this study, a new measure for measuring volatility was proposed. Experience used, integration theory, error correction representation of exchange rate fluctuations operations, for integration using the Automated Progress Distribution (ARDL) model. Overall, our findings suggest a negative effect of volatility on tourist arrivals for Iceland.

Rathnayake (2018) examines the effects of exchange rate fluctuations on incoming tourism in Sri Lanka using monthly data on tourist arrivals, exchange rates and other relevant variables from 1990 to 2016. An Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) model is used to generate a measure of exchange rate volatility. The results expose that there are significant negative short-run, and long-run effects of exchange rate volatility on tourist flows to Sri Lanka.

Mustafa (2019) was investigating the Contribution of Tourism and Foreign Direct Investment (FDI) to Gross Domestic Production (GDP) in Sri Lanka. To achieve its goal, the nonparametric approaches such Nearest Neighbor Fit, Kernal Fit, and Confidence Ellipse to find the relationship were used in this study. Error Correction Mechanism, Co-Integration, and Analysis of Causality are the econometric techniques used to find the relationship and the result revealed that the relationship between Tourism Receipts and Gross Domestic Production has been positively and statistically significant.

Nisthar and Nufile (2019) analyzed the relationship between tourist arrival and exchange rates in Sri Lanka. They used time-series data from 1950 – 2014. In this study, the tourists' arrivals were the dependent variable and exchange rate of French Franc, exchange rate of Indian rupee, exchange rate of Japanese Yen, exchange rate of a pound sterling, exchange rate of US dollar, and dummy were the independent variables. They found that all the variables had a long-run association.

In Sri Lanka, a few studies have been done on this topic. This study differs from the existing studies on the exchange rate and tourism in at least three ways.

- Used more recent data on tourist arrival and exchange rate.
- This study used Quarterly data.
- Applied more relevant econometrics methodologies in time series analysis to investigate.

3. Data and Methodology

Data Description and sources

The main sources of data for this study are Sri Lankas' secondary sources. This study makes use of quarterly time series data from 1973 Q1 – 2020 Q1. The data set includes two variables. Total tourist arrival was obtained from the Central Bank of Sri Lanka and Exchange rate (Sri Lankan rupees to one U.S dollar) was obtained from the website of FRED Economic data. the graph 1 has 4 scenarios. First scenario is original series of tourist arrivals in natural logarithms. It shows clear seasonality and fluctuation upward trend.

We can be de seasonalized the time series data by using two ways. If we assume the seasonal pattern to be purely deterministic in a time series (Y_t), then we could estimate the model like below (Enders, 1995).

[1] $$Y_t = \propto_0 + \propto_1 D_1 + \propto_2 D_2 + \propto_3 D_3 + \hat{u}_t$$

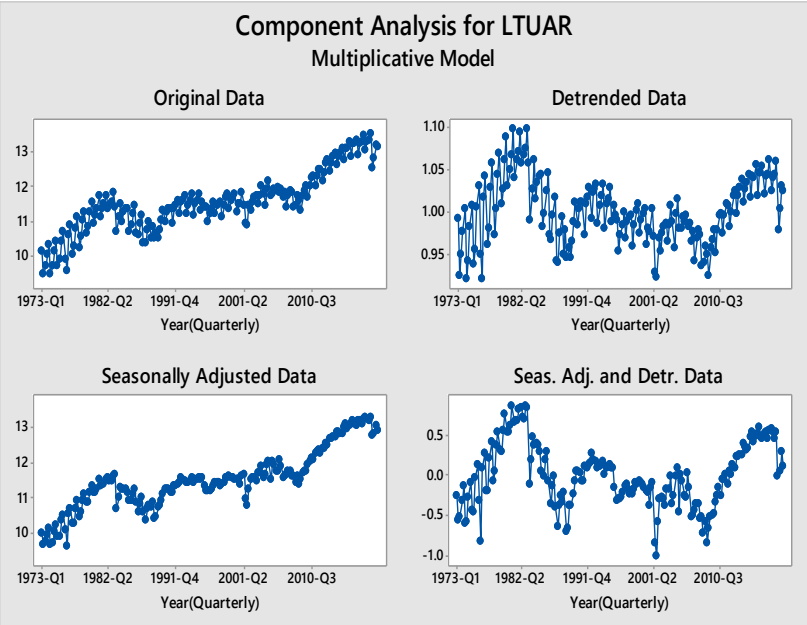
Where,

D1, D2, and D3 - Quarterly seasonal dummies

$\hat{u}_t$ - De seasonalized values of Y_t

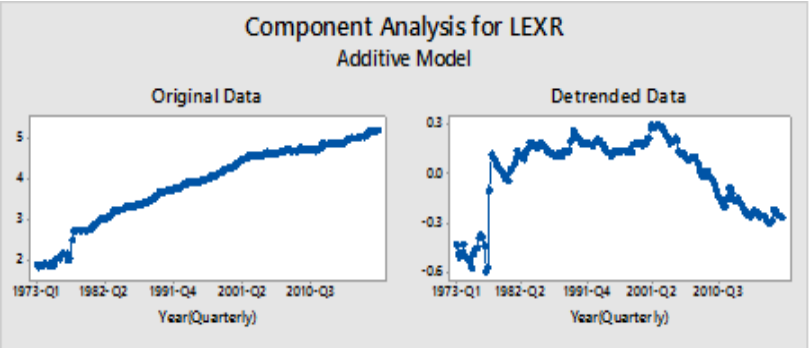
Another way of removing the seasonal components is by testing for seasonal unit roots and applying the relevant seasonal filters to the original series (Engle and Granger, 1987). We follow this approach to obtain the de seasonalized series. Graph 1, 2nd scenario present for the de seasonalized tourist arrivals. Then removed the trend, we get the seasonal adjusted and de trended data (Graph 1, scenarios 4). The first graph's first scenario is the original series of exchange rate in natural logarithms. It shows an upward trend only. When we removed the trend by testing for trend unit-roots, get scenario 2.

Graph 1: Original Series of Number of Total Tourist Arrivals (LTUAR), Sri Lanka, 1973: Q1 – 2020: Q1 (In Natural Logs)



Note: The series is quarterly series and 1 is the first quarter (January, February, March)

Graph 2: Original Series of Exchange Rate (LEXR), Sri Lanka, 1973: Q1 – 2020: Q1 (In Natural Logs)



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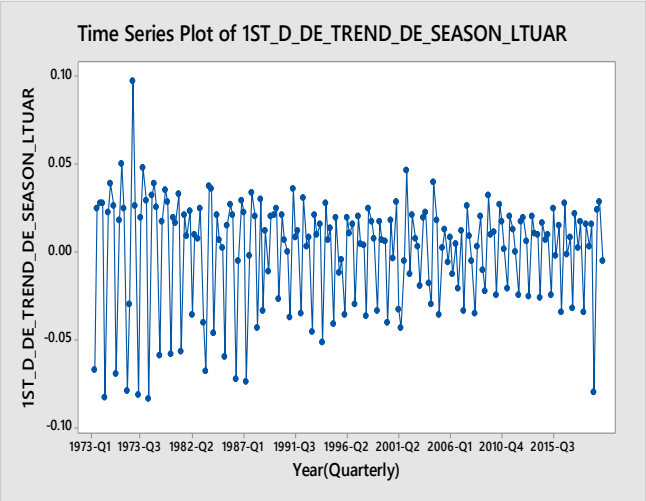
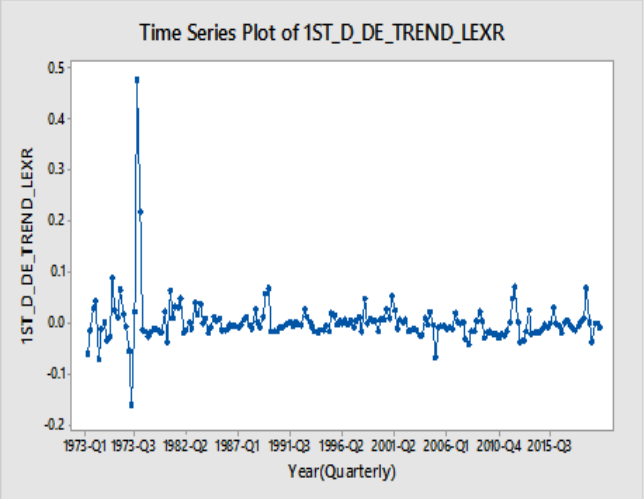
cenario 1 graph 4 and scenario 2 graph 1 suggest no evidence of changing means signifying that both series may be integrated of order one [I (1)].

Graph 3: The first different series of Tourist arrivals of Sri Lanka, 1973: Q1 – 2020: Q1



Graph 4: The first different series of Exchange Rate of Sri Lanka, 1973: Q1 – 2020: Q1



We test the stationary of these two series using the Augmented Dickey-Fuller (ADF) unit-root test. To perform the ADF test on the de seasonalized and de trended series of TUAR and de trend series EXR, we estimate the following regression model.

Constant and no trend model

[2] $\Delta y_t = \alpha_0 + \gamma y_{t-1} + \sum_{i=1}^{q} \beta_i \Delta y_{t-i} + \varepsilon_t$

where,

$\Delta y_t = y_t - y_{t-1}$- the first difference of the series y_t
$\Delta y_{t-1} = y_{t-1} - y_{t-2}$- the first difference of y_{t-1}
$\varepsilon_t =$ stochastic disturbance term

We have done the ADF test to the TUAR and EXR series one by one. Selected the no of lags to ensure that the errors are uncorrelated. 159 sample sizes were used in the estimation. We carry out the estimation of the models using the econometric software E-views-10 and Minitab-17. The results of the Augmented Dickey-Fuller (ADF) test for stationary are presented in Table 1. We can conclude the series in the level form are non-stationary.

Table 1: ADF Test Results for a Unit Root on the Level Form of the Original Series.

Form	Model	LTUAR	LEXR	Stationary
		P-Value		
Level	Intercept and no trend	0.1619	0.2797	No

We test the first difference of both series for stationary by applying the ADF test on the first difference series. The results are shown in Table 2. The results show that both series are stationary in their first difference form. That means the series is I (1).

Table 2: ADF Test Results for a Unit Root on the first form of the Original Series.

Form	**Model**	**LTUAR**	**LEXR**	**Stationary**
		P-Value		
First Different	Intercept and no trend	0.0000	0.0000	I (1)

If the two variables TUAR and EXR, are I (1), it may be possible that a linear combination of the two variables may be stationary. If we are exhibiting a linear relationship between TUAR and EXR, even there are individually non-stationary. Thus, we now investigate whether the two series are cointegrated and having a long-run relationship. We used the Engle and Granger (1987) procedure, which is based on testing for a unit root in the residual series of the estimated equilibrium relationship by employing the Dickey-Fuller test. Therefore, the null and alternative hypotheses are:

H_0: The residual series has a unit root (or TUAR and EXR are not cointegrated)
H_1: The residual series has no unit root (or TUAR and EXR are cointegrated)

The residual unit root test results are Showed in Table 3. The results on the table clearly show that both the least-squares residual series are non-stationary.

Table 3: Test for Co-integration of TUAR and EXR on the residual

Dependent Variable	P-Value	Stationary
TUAR	0.1532	non-stationary
EXR	0.2793	

TUAR and EXR are not cointegrated indicating that there is no long-run equilibrium relationship between TUAR and EXR in Sri Lanka. Therefore, there are no long-term relationship. They may be related in the short-run which relations analyzed by a VAR system in first differences.

We determine the optimal lag length for the VAR system by using the Schwarz Criterion (SC) and Hannan-Quinn criterion (HQ). We found that the optimal lag lengths for both the TUAR and EXR series to be 4 lags. We estimate the VAR (4) system in the following form with all variables in the first-difference form and test various hypotheses.

[3] $$\Delta \boldsymbol{TUAR_t} = \alpha_{01} + \alpha_{11}\Delta TUAR_{t-1} + \alpha_{21}\Delta TUAR_{t-2} + \alpha_{31}\Delta TUAR_{t-3} + \alpha_{41}\Delta TUAR_{t-4} + \beta_{11}\Delta EXR_{t-1} + \beta_{21}\Delta EXR_{t-2} + \beta_{31}\Delta EXR_{t-3} + \beta_{41}\Delta EXR_{t-4} + u_{1t}$$

[4] $$\Delta \boldsymbol{EXR_t} = \alpha_{02} + \alpha_{12}\Delta TUAR_{t-1} + \alpha_{22}\Delta TUAR_{t-2} + \alpha_{32}\Delta TUAR_{t-3} + \alpha_{32}\Delta TUAR_{t-4} + \beta_{12}\Delta EXR_{t-1} + \beta_{22}\Delta EXR_{t-2} + \beta_{32}\Delta EXR_{t-3} + \beta_{42}\Delta EXR_{t-4} + u_{2t}$$

In equation (3) the null and alternative hypothesis to test,

$H_0: \beta_{11} = \beta_{21} = \beta_{31} = \beta_{41} = 0$ (Non-causality)

$H_1: \beta_{11} \neq \beta_{21} \neq \beta_{31} \neq \beta_{41} \neq 0$ (causality)

In equation (4) the null and alternative hypothesis to test,

$H_0: \alpha_{11} = \alpha_{21} = \alpha_{31} = \alpha_{41} = 0$ (Non-causality)

$H_1: \alpha_{11} \neq \alpha_{21} \neq \alpha_{31} \neq \alpha_{41} \neq 0$ (causality)

The Granger causality output showed in table 4. According to this result, P-value (0.0340) < alpha (0.05), we can conclude exchange rate cause total tourist arrivals. and P-value (0.0044) < alpha (0.05), we can conclude total tourist arrivals cause exchange rate. Finally, we say there is two-way causality between exchange rate and total tourist arrivals.

Table 4: Results of Granger Causality Test TUAR and EXR in Sri Lanka, 1973: Q1 – 2020: Q1

Dependent Variable	P-Value
1ST_D_DE_TREND_DE_SEASON_LTUAR	0.0340
1ST_D_DE_TREND_LEXR	0.0044

4. Conclusion

This paper points out the causality between exchange rate and tourist arrivals using suitable econometric techniques such as unit root test, cointegration, and causality. Here we used quarterly data—the VAR system in first-difference of the two variables to investigate the causality between tourism and exchange rate The results show that there is a two-way causal relationship between EXR and TUAR. The exchange rate and tourism are influenced factors in economic growth. So,

when we focused or implemented any appropriate policies and plans, we assumed that causality between the exchange rate and tourist arrivals.

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