Tourism and Economic Growth Nexus in Sri Lanka

Kalaichelvi Ravinthirakumaran
Economics and Business Statistics Discipline
Griffith Business School
Griffith University

Abstract

This paper examines the dynamic relationship between tourism and economic growth in Sri Lanka over the period 1968–2014 using a Vector Autoregressive (VAR) framework. Empirical results show that a significant long-run equilibrium relationship exists between tourism and economic growth. The results further show that a unidirectional causal relationship exists from tourism to economic growth in both the long-run and the short-run, supporting the tourism-led growth hypothesis. In order to enhance economic growth, the paper recommends that the Sri Lankan government should develop policies to promote tourism related activities and maintain a competitive exchange rate.

Keywords: Tourism, Economic growth, Cointegration, Causality

JEL Classification: C32, F41, O43
1. Introduction

The contribution of tourism to an economy has long been a subject of great interest from a policy perspective. Tourism has proven to be a strong and resilient economic activity that generates billions of dollars in exports and creates millions of jobs. According to the World Tourism Barometer (April, 2015), exports from international tourism has reached to US$ 1.5 trillion in 2014. Further, among the worldwide export category, tourism has been ranked fourth after fuels, chemicals and food. In many countries, tourism is used as a tool to increase foreign exchange income, government revenue, level of employment (both direct and indirect) and socio-economic status (particularly in developing countries). With these benefits in mind, the World Tourism Organization (UNWTO, 2014) calls upon governments to set up national strategies that support the tourism sector and to deliver on their commitment to fair and sustainable growth.

It is a common belief that tourism positively contributes to economic growth. Although the relationship between tourism and economic growth has been studied extensively, there is no agreement on whether tourism causes economic growth (tourism-led growth or TLG) or economic growth causes tourism (growth-led tourism or GLT) or the causality is in both directions. This issue is paramount in the sense that establishing the causality between tourism and economic growth has many policy implications with respect to policy makers adopting correct strategies and policies for economic growth and development. However, the causal link between tourism and economic growth still remains the subject of debate. Besides, these empirical results are very sensitive to the country characteristics, selection of model specification and econometric techniques, and data set used.

The objective of this paper is to analyse the role of tourism plays on the economic growth of a developing country, Sri Lanka. While this paper analyses the relationship between tourism and economic growth in Sri Lanka, it also aims to find answers to the following questions. (i) What is the causal direction of any relationship between tourism and economic growth? (ii) Is the tourism-led economic growth hypothesis supported by the Sri Lankan data? (iii) Are there any other factors that significantly influence tourism in Sri Lanka? (iv) Did the civil war cost Sri Lanka in terms of tourism earnings?

In this study, our contribution differs from existing Sri Lankan studies in the following ways. First, this is the first study which considers the effect of war in testing the TLG hypothesis
including the post-war period (after 2009). The inclusion of relevant variables (for example, exchange rate and war) corrects for misspecification bias associated with multivariate models that test the validity of the TLG hypothesis. Second, previous studies focus only on cointegration and causality. Here, we investigate the dynamic causal relationship among our variables of interest through the VAR framework. In addition, we identify the structural shocks using impulse response function and variance decomposition. Third, this study uses the most recent data and a relatively larger sample size (1968–2014).

The remainder of this paper is organized as follows: Section 2 reviews the related literature on tourism and economic growth. Section 3 presents an overview of the tourism industry in Sri Lanka. Section 4 describes the data used, methodology and empirical results. Section 5 provides the conclusion and policy implications.

2. Literature Review
In this section, we present a brief review of studies that analysed the relationship between tourism and economic growth.

Theoretical Background
A number of studies analyse the relationship between tourism and economic growth under the trade and endogenous growth models (For example, see Adamou and Clerides, 2010; Khan and Lin, 2002; Lanza and Pigliaru, 2000; Toit et al., 2010; Seetanah, 2011; Zhang and Jensen, 2007). These studies use comparative advantage theory and Heckscher–Ohlin theorem to explain the nexus between tourism and economic growth. The Ricardo’s comparative advantage theory which asserts that, if country 1 is more efficient in absolute terms in producing certain goods than country 2, then trade can be gained if country 1 specializes in the production and export of these goods. In this case, country 1 produces relatively efficiently than country 2, which is called comparative advantage for country 1. Hence, Ricardian theory is useful in indicating the gains which countries can make from international tourism if they are relatively efficient in tourism production and, hence, points to the importance of increasing production efficiency (Stabler et al., 2010).

On the other hand, Heckscher–Ohlin (H–O) theorem which describes the pattern of trade between countries in terms of relative differences in their factor endowments. This theory
postulates that a country’s endowments of factors of production (labour, capital and land/natural resources), rather than relative efficiencies of production, determine its comparative advantage. The availability of accessible natural resources becomes a comparative advantage in the tourism production function and explains why destinations with these elements have often specialised in tourism (Stabler et al., 2010). Accordingly, the role of countries’ different resource endowments helps to explain international tourism which means that the country with a relative abundance of the natural resource will specialize in tourism. Therefore, countries like Sri Lanka which have a large supply of labour and land as well as plentiful natural resources such as wildlife, rain forest, mountains and beaches and heritage sites would appear to have a comparative advantage in tourism.

The second strand of theoretical literature is based on endogenous growth theory. Endogenous growth theory focuses on investment in human capital, innovation, and knowledge which are significant contributors to economic growth. The endogenous growth model establishes the links between long-run growth and technological progress, and provides a framework in which trade can increase the rate of growth through technology transfer, positive externalities and spillover effects (Lucas, 1988; Romer, 1990). Some researchers have used Lucas’ endogenous growth model (1988) to explain the tourism (Gokovali and Bahar, 2006; Lanza and Pigliaru, 1995; Parrilla et al., 2007; Seetanah, 2011). The inclusion of tourism (tourism specialization), as a third input in the production function, helps countries increase their economic growth. According to Lanza and Pigliaru (1995), as productivity is a major component of growth, if technological progress is higher in the manufacturing sector than in the tourism sector, tourism specialization is growth enhancing if, and only if, the change in the terms of trade between tourism and manufacturing goods more than balances the technological gap of the tourism sector (Seetanah, 2011).

**Empirical studies**

A number of single country and cross-country studies have appeared in the literature that have analysed the causal relationship between tourism and the economic growth. Table 1 presents a summary review of a selected number of such studies by listing the data period, country of study, type of methodology used and their findings. As can be seen, results from most of the empirical studies on Table 1 reveal that tourism plays a positive role an enhance economic growth (Arezki et al., 2009; Adamou and Clerides, 2010; Brida et al., 2011; Deng
et al., 2014; Fayissa et al., 2008; Lee and Chang, 2008; Narayan et al., 2010; Po and Huang, 2008; Proenca and Soukiazis, 2008; Srinivasan et al., 2012; Tang and Tan, 2015).

While some of the studies (Balaguer and Cantavella-Jorda, 2002; Belloumi, 2010; Chen and Chiou-Wei, 2009; Ghartey, 2013; Jayathilake, 2013; Katircioglu, 2011; Lean and Tang, 2010; Tang and Tan, 2015; Trang et al., 2014; Wickremasinghe and Ihalanayake, 2006), confirm the direction of the causality from tourism to economic growth, two studies (Oh, 2005; Suresh and Senthilnathan, 2014) find the direction causality is in the opposite direction. In the meantime, another group of studies (Chen and Chiou-Wei, 2009; Corrie et al., 2013; Khalil et al., 2007; Lee and Chien, 2008; Samimi et al., 2011; Sumei et al., 2012) reveal the bi-directional causality between tourism and economic growth. However, Georgantopoulos (2013) fails to support the causal links between tourism and economic growth. Table 1 also shows the test results of the TLG hypothesis in terms of the extent to which development would have an influence. Eugenio-Martín et al. (2004) find that tourism development contributes to the economic growth for low and medium income countries. Similar result is obtained by Lee and Chang (2008) for non-OECD countries and Seetanah (2011) for 19 island economies. These results appear to be in favour of tourism fostering growth to a greater degree in countries with a lower income level.

3. An overview of the Tourism industry in Sri Lanka

In this section, we briefly discuss the historical evolution of international tourism in Sri Lanka and in the following section we present an empirical analysis of the relationship between tourism and economic growth in Sri Lanka.

Sri Lanka is an island in the Indian Ocean, which has been considered as one of the most attractive destination for tourist due to its plentiful natural resources including wildlife, rain forest, mountains, beaches, and heritage sites. Apart from this, the country’s important geographical location also enables it to attract transit visitors to the island.

In Sri Lanka, prior to the Second World War, the effort to develop tourism with the establishment of the ‘Tourist Bureau’ was first made by British colonial government in 1937. Even though the Bureau was established to provide facilities and services for passengers who
Table 1: A review of empirical studies on tourism and economic growth

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Period</th>
<th>Country</th>
<th>Technique</th>
<th>Variables</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arezki et al. (2009)</td>
<td>1980–2002</td>
<td>127 countries</td>
<td>Multiple Regression</td>
<td>Economic growth, tourism receipts, GDP per capita, education, distance, relative price of capital and consumption goods, openness, quality of institutions</td>
<td>Tourism impacts on economic growth</td>
</tr>
<tr>
<td>Adamou and Clerides (2010)</td>
<td>1980–2005</td>
<td>162 countries</td>
<td>Multiple Regression</td>
<td>GDP per capita growth, tourism receipts, tourism arrivals, lagged of GDP, openness, investment, government size, life expectancy, fertility rate, inflation</td>
<td>Tourism impacts on economic growth, but the relationship is not statistically significant</td>
</tr>
<tr>
<td>Antonakakis et al. (2015)</td>
<td>1995–2012</td>
<td>10 European countries</td>
<td>VAR</td>
<td>industrial production, tourist arrivals</td>
<td>The causal relationship between tourism and economic growth is not stable over time</td>
</tr>
<tr>
<td>Brida et al. (2011)</td>
<td>1965–2007</td>
<td>Brazil</td>
<td>VAR</td>
<td>GDP per capita, tourism receipts, exchange rate</td>
<td>Tourism impacts on economic growth - long-run relationship among the variables</td>
</tr>
<tr>
<td>Chen and Chiou-Wei (2009)</td>
<td>1975(1)–2007(1)</td>
<td>Taiwan and South Korea</td>
<td>GARCH</td>
<td>GDP, tourism receipts and exchange rate</td>
<td>Tourism ⇒ Growth (Taiwan) Tourism ⇔ Growth (South Korea)</td>
</tr>
<tr>
<td>Corrie et al. (2013)</td>
<td>2000(3)–2010(2)</td>
<td>Australia</td>
<td>Cointegration VECM</td>
<td>GDP, tourism expenditure, exchange rate, consumer price index</td>
<td>Tourism ⇔ Growth</td>
</tr>
<tr>
<td>Deng et al. (2014)</td>
<td>1987–2010</td>
<td>China’s 30 provinces</td>
<td>Panel threshold regression</td>
<td>GDPPC growth, tourism receipts, GDPPC, domestic investment, government consumption, FDI, education</td>
<td>Tourism impacts on economic growth, but the relationship not statically significant</td>
</tr>
<tr>
<td>Eugenio-Martín et al. (2004)</td>
<td>1985–1998</td>
<td>21 Latin American countries</td>
<td>GMM</td>
<td>GDP, tourist arrivals, domestic investment, government consumption, education, political stability, corruption</td>
<td>Tourism impacts on economic growth in medium or low-income countries but not in the developed countries</td>
</tr>
<tr>
<td>Author (year)</td>
<td>Period</td>
<td>Country</td>
<td>Technique</td>
<td>Variables</td>
<td>Findings</td>
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<tr>
<td>Georgantopoulos</td>
<td>1988–2011</td>
<td>India</td>
<td>Cointegration VECM</td>
<td>GDP, tourism expenditure, exchange rate</td>
<td>No causal relationship between tourism and economic growth</td>
</tr>
<tr>
<td>Katircioglu (2011)</td>
<td>1960–2007</td>
<td>Singapore</td>
<td>ARDL</td>
<td>GDP, tourist arrivals, exchange rate</td>
<td>Tourism ⇒ Growth</td>
</tr>
<tr>
<td>Khalil et al. (2007)</td>
<td>1960–2005</td>
<td>Pakistan</td>
<td>Cointegration ARDL</td>
<td>GDP, tourism receipts</td>
<td>Tourism ⇔ Growth</td>
</tr>
<tr>
<td>Lee and Chang (2008)</td>
<td>1990–2002</td>
<td>OECD and non OECD countries</td>
<td>Cointegration</td>
<td>GDP per capita, tourism receipts, tourist arrivals, exchange rate</td>
<td>Tourism impacts on economic growth in non OECD than in OECD countries, long-run relationship among the variables</td>
</tr>
<tr>
<td>Lee and Chien (2008)</td>
<td>1959–2003</td>
<td>Taiwan</td>
<td>Cointegration Granger Causality</td>
<td>GDP, tourism development, tourism receipts, tourist arrivals, exchange rate</td>
<td>Tourism ⇔ Growth</td>
</tr>
<tr>
<td>Oh (2005)</td>
<td>1975–2001</td>
<td>Korea</td>
<td>VAR</td>
<td>GDP, tourist arrivals</td>
<td>Growth ⇒ Tourism</td>
</tr>
<tr>
<td>Proenca and Soukiazis (2008)</td>
<td>1990–2004</td>
<td>Greece, Italy, Portugal and Spain</td>
<td>Multiple Regression</td>
<td>GDP Per capita, tourism receipts</td>
<td>Tourism impacts on economic growth in all countries</td>
</tr>
<tr>
<td>Samimi et al. (2011)</td>
<td>1995–2008</td>
<td>Developing</td>
<td>VAR</td>
<td>GDP, tourist arrival</td>
<td>Tourism ⇔ Growth</td>
</tr>
<tr>
<td>Author (year)</td>
<td>Period</td>
<td>Country</td>
<td>Technique</td>
<td>Variables</td>
<td>Findings</td>
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<tr>
<td>Seetanah (2011)</td>
<td>1990–2007</td>
<td>19 island countries</td>
<td>GMM</td>
<td>GDP per capita, investment, education, openness, economic freedom, tourist arrivals, tourism receipts</td>
<td>Tourism impacts on economic growth in island countries</td>
</tr>
<tr>
<td>Sumei et al. (2012)</td>
<td>1999(1)–2005(4)</td>
<td>China</td>
<td>Cointegration VECM</td>
<td>GDP, tourist arrivals, exchange rate</td>
<td>Tourism ⇔ Growth</td>
</tr>
</tbody>
</table>

Notes: ⇒ indicates uni-directional causality running from the variable on the left to the right, whereas ⇔ indicates bi-directional causality. GARCH denotes generalized autoregressive conditional heteroskedasticity. ARDL and GMM represent autoregressive distributed lag and generalized method of moments, respectively. VAR and VECM indicate vector autoregression and vector error correction model, respectively.
sailed between the West and the East through the port of Colombo on passenger ships, the
Tourist Bureau ceased its operations in 1940 due to the commencement of the Second World
War (SLTDA, 2014). After gaining independence from Britain, in 1948, the new government
decided to recommence tourist activities by setting up the ‘Government Tourist Bureau’ later
with a name change to ‘Ceylon Tourist Board’ in 1966. Since then, the tourism industry
expanded rapidly. In 2005, under a new Act of Parliament, the Ceylon Tourist Board became
to ‘Sri Lanka Tourism Development Authority’ (SLTDA), which is committed towards
transforming Sri Lanka to be Asia’s leading tourism destination (motto: Sri Lanka - wonder
of Asia). The SLTDA strives to develop diverse, unique and quality tourism services and
products that would make Sri Lanka a unique destination globally.

Figure 1 shows the number of tourist arrivals (right axis) and tourism receipts (left axis) in Sri
Lanka over the period 1968–2014. As can be seen, number of tourist arrivals to Sri Lanka
continued to increase until 1982 (except during 1971 due to the revolt of an extreme leftist
movement, Janatha Vimukthi Peramuna (JVP), tried to overthrow then leftist government). In
1983, the number of tourist arrivals has dropped considerably (by 17 per cent), due to the
communal riots and start of the civil war. During the long Eelam war between the Liberation
Tigers of Tamil Eelam (LTTE) and the Sri Lankan armed forces, there were major
fluctuations in tourist arrivals, from 1983 to 2009. However, in the early 1990s, prospective
tourists from Western countries began to realise that the war was only in the north and east
while the rest of the country was safe, and hence the tourist arrivals slowly increased from
1990 and until 1994. Due to a new offensive by the Government in early 1995, there was a
fall in the number of tourist arrivals to Sri Lanka and then started to increase in 1997 with
news of peace talks. In 2002, when the ceasefire agreement between the LTTE and the Sri
Lankan government was signed, again tourist arrivals started to increase. Apart from the
Eelam war, the tourism industry was also badly affected by the 2004 Asian tsunami.
However, with end of the war in May 2009, there has been a boom in the tourism industry.
Tourist arrivals have increased from 447,890 in 2009 to 654,476 in 2010 (an increase of 46
per cent). While Sri Lanka had set a target of 1.5 million tourist arrivals in 2014, the number
reached 1.52 million, well above the targeted level (SLTDA, Annual Statistics Report, 2014).
Tourism is one of the main sources of foreign exchange for Sri Lanka. Tourism has moved, from fifth place in 2012 to fourth place in 2013, as the major source of foreign exchange for the Sri Lankan economy. The tourism contribution to total foreign exchange earnings in 2013 was 7.9 per cent (SLTDA, Annual Statistics Report, 2013). The line graph in Figure 1 represents Sri Lanka’s tourism receipts from 1968 to 2014. The fluctuations in tourism receipts are similar to that of tourist arrivals. The tourism receipts continued to increase until 2009 with some fall in war years and then increased dramatically from 2009, end of the war. In 2014, tourism receipts have increased by 41.7 per cent compared to 2013. Figure 1 also clearly indicates that the tourism industry has again been on the increase since the end of the war in 2009.

The Sri Lankan Government recognises the multiplier effect of tourism development on its economy and the importance of prioritising the tourism sector as one of the important source of income. The new tourism development strategy for Sri Lanka was released for the period 2011 to 2016. Under this strategy, the key objectives are i) Positioning Sri Lanka as one of the most sought after tourist destinations; ii) To reach an annual tourist arrivals target of 2.5 million by 2016; iii) Increase the annual foreign exchange earnings to US$ 2.75 billion by 2016; iv) Attract US$ 3 billion FDI within next 5 years; v) Create 500,000 tourism related
employment by 2016 (Ministry of Economic Development, 2011). Additionally, according to New York Times (2010), Sri Lanka has been listed as a number one destination to travel, among 31 places in 2010. In addition, in 2015, Sri Lanka’s capital city Colombo has been placed on top of 10 fastest growing cities for travellers in the world, by the MasterCard Global Destination Cities Index (Hedrick-Wong and Choong, 2015).

4. Data and methodology

In this section, we present the data source and investigate the relationship between tourism and economic growth in Sri Lanka.

Data source and definitions of variables

For the analysis, we use the annual time series data for the period 1968–2014 on economic growth, tourism and exchange rate. GDP per capita (constant 2005 US$) is used as proxy for economic growth. The tourism receipts (US$m) represent the tourism variable. In order to deal with potential overlooked variable problems and to account for external competitiveness, many researchers have included real exchange rate in tourism and growth model (Balaguer and Cantavella-Jorda, 2002; Belloumi, 2010; Chen and Chiou-Wei, 2009; Lee and Chien, 2008; Oh, 2005). The real exchange rate is calculated as foreign currency units per domestic currency (US$ per Sri Lankan Rupees) multiplied by the ratio of consumer price index for Sri Lanka to consumer price index for the US. These data for GDP per capita and exchange rate and CPI’s are obtained from the World Development Indicators (WDI) Database published by the World Bank and the data for tourism receipts are from Sri Lanka Tourism Development Authority. We use a dummy variable (WAR) to capture the effect of the war on tourism during relevant periods. The WAR variable takes the value 1 for the war years 1971, 1983–1988, 1995–1996, 2000–2001 and 2006-2008, and 0 otherwise.

We use the following model to analyse the relationship between tourism receipts, real exchange rate and economic growth.

\[ \text{LGDPPC} = \beta_0 + \beta_1 \text{LTOUR} + \beta_2 \text{LREXCH} + \beta_3 \text{WAR} + \varepsilon \]  

(1)
Here, \( LGDPPC \) represents real GDP per capita, \( LTOUR \) represents tourism receipts, \( LREXCH \) is real exchange rate, \( WAR \) is the dummy variable as described above and \( \epsilon \) is the error term. All variables except \( WAR \) are in natural logarithm.

Figure 2 shows the time series plots of the three variables in their level form and in first difference form. As can be seen, the plots suggest that the three variables in level form appear to be non-stationary while they may be stationary in their first difference form.

**Unit root test**

In order to avoid spurious regression estimation results of the model, in the first step stationary property of GDP per capita, tourism receipts and real exchange rate variables have been investigated. The unit root test is performed by using Augmented Dickey-Fuller (ADF, 1979) and Phillips-Perron (PP, 1988) tests. These tests examine the null hypothesis of unit root process against the alternative hypothesis of no unit root. The results of these two unit root tests are presented in Table 2. As can be seen, null hypothesis of a unit root cannot be rejected for all three variables in their level form. However, at the first difference, the null hypothesis of unit root can be rejected for all three variables. Hence, the results confirm that all three variables have a unit root in level form and are stationary in their first difference form. This indicates that all these variables are integrated of order one that is \( I(1) \).

**Figure 2: Plots of the three variables in level and first difference form, 1968 – 2014**
Table 2: Unit root test results

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Levels</td>
<td>First differences</td>
</tr>
<tr>
<td>LGDPPC</td>
<td>1.05</td>
<td>-4.34*</td>
</tr>
<tr>
<td>LTOUR</td>
<td>-2.37</td>
<td>-4.30*</td>
</tr>
<tr>
<td>LREXCH</td>
<td>-1.13</td>
<td>-7.36*</td>
</tr>
</tbody>
</table>

Note: * denotes the rejection of the unit root hypothesis at the 1% level of significance with -3.585 critical values.

**Cointegration Test**

Having tested for the stationarity of each time series and found that all of them are I(1), the next step is to examine whether there exists a long-run relationship between the variables in our model. The cointegrating relationship has been tested using the tests proposed by Johansen (1988) and Johansen and Juselius (1990).

Johansen (1991) tests are based on reduced rank regression in which the maximum likelihood estimates are computed in the multivariate cointegration model with Gaussian errors. One of the advantages of this technique is that it allows one to draw a conclusion.
about the number of cointegrating relationships among observed variables. Another advantage is not requiring priori assumptions of endogeneity or exogeneity of the variables. Johansen proposes the following test statistic based on the likelihood ratio test determined by the following test statistic:

\[
\lambda_{\text{trace}} = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \quad r = 0, 1, 2, \ldots, n-1
\]

where \( T \) is the number of observations, \( \hat{\lambda}_i \) is the \( i \)th eigen value and \( n \) is the number of endogenous variables.

The results are reported in Table 3. The optimum 2 lags have been selected based on Akaike Information Criteria. As can be seen, the null hypothesis of no cointegration relationship is rejected against at least one cointegrating vector at the 1% significance level. This suggests that at least one co-integrating vector exists in the model. In the next step, when we test the null hypothesis of one cointegrating vector against the alternative hypothesis of at least 2 co-integrating vectors, there is no support for the alternative hypothesis. Therefore, it is concluded that there is only one cointegrating relationship among the four variables.

<table>
<thead>
<tr>
<th>Table 3: Johansen Test for Cointegration</th>
</tr>
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<tbody>
<tr>
<td>( H_0 )</td>
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<td>---</td>
</tr>
<tr>
<td>( r = 0 )</td>
</tr>
<tr>
<td>( r \leq 1 )</td>
</tr>
<tr>
<td>( r \leq 2 )</td>
</tr>
</tbody>
</table>

Note: * indicates test statistics are significance at the 1% level.

If the variables are cointegrated, then it implies that causality must exist at least in one direction (Engel and Granger, 1987). The direction of the Granger causality can be detected through the Vector Error Correction Model (VECM) derived from the long-run co-integrating vectors.
**Vector Error Correction Model Estimation**

When the variables of a vector autoregression are co-integrated, we use a VECM econometric framework for dealing with multiple time series (Engle and Granger, 1987). The VECM consists of four variables: GDP per capita, tourism receipts and real exchange rate are endogenous variables and WAR is an exogenous variable. The VECM has co-integration relations built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge to their co-integrating relationships while allowing for short-run adjustment dynamics. VECM representation would have the following form:

\[
\Delta \text{LGDP}_{t} = \alpha_{1} + \eta_{11} \Delta \text{LGDP}_{t-1} + \eta_{12} \Delta \text{LTOUR}_{t-1} + \\
\eta_{13} \Delta \text{LREXCH}_{t-1} + \phi_{11} \Delta \text{LGDP}_{t-2} + \phi_{12} \Delta \text{LTOUR}_{t-2} + \phi_{13} \Delta \text{LREXCH}_{t-2} + \alpha_{1} \text{WAR}_{t} + \lambda_{1} \text{ECT},_{t-1} + u_{1t}
\]

\[
\Delta \text{LTOUR}_{t} = \alpha_{2} + \eta_{21} \Delta \text{LGDP}_{t-1} + \eta_{22} \Delta \text{LTOUR}_{t-1} + \\
\eta_{23} \Delta \text{LREXCH}_{t-1} + \phi_{21} \Delta \text{LGDP}_{t-2} + \phi_{22} \Delta \text{LTOUR}_{t-2} + \phi_{23} \Delta \text{LREXCH}_{t-2} + \alpha_{2} \text{WAR}_{t} + \lambda_{2} \text{ECT},_{t-1} + u_{2t}
\]

\[
\Delta \text{LREXCH}_{t} = \alpha_{3} + \eta_{31} \Delta \text{LGDP}_{t-1} + \eta_{32} \Delta \text{LTOUR}_{t-1} + \\
\eta_{33} \Delta \text{LREXCH}_{t-1} + \phi_{31} \Delta \text{LGDP}_{t-2} + \phi_{32} \Delta \text{LTOUR}_{t-2} + \phi_{33} \Delta \text{LREXCH}_{t-2} + \alpha_{3} \text{WAR}_{t} + \lambda_{3} \text{ECT},_{t-1} + u_{3t}
\]

where \(\Delta\) denotes first difference operator and \(u_{1t}, u_{2t}, \text{and } u_{3t}\) are serially uncorrelated random error terms with mean zero. The error correction term (ECT) is the lagged ECTs derived from the long-run cointegrating relationship. The coefficients, \(\lambda_i\)'s, of the ECTs represent the deviation of the dependent variables from the long-run equilibrium.

The system of equations allows us to test for both the short-run and long-run causality between the variables. The Granger causality procedure involves testing for the significance of the coefficients \(\phi_{ij}\) and \(\eta_{ij}\) conditional on the optimum lags. This can be implemented using.
a standard $\chi^2$ Wald test. Through the ECT, an error correction model offers an alternative test of causality (or weak exogeneity of the dependent variable). The significance of $\lambda_i$'s indicates that the long-run equilibrium relationship is directly driving the dependent variable.

Granger causality of the dependent variables can be tested in the following three ways (Belloumi, 2010): (i) simple $t$-test of the $\lambda_i$'s; (ii) joint $\chi^2$ Wald test for testing the significance of the sum of the lags of each of the explanatory variables; and (iii) joint $\chi^2$ Wald test of the significance of the ECTs and lags of each of the explanatory variables (for example, in Eq. (2): $\lambda_i=0$, $\eta_{12}=0$, $\varphi_{12}=0$; $\lambda_i=0$, $\eta_{13}=0$, $\varphi_{13}=0$). The Error Correction Models given by equations (2)-(4) depicting the relationship between the tourism receipts, real exchange rate and economic growth are estimated. The results with GDPPC as dependent variable given in equation (2) are reported below.\(^1\)

\[
\begin{align*}
\Delta \text{LGDPPC}_t &= 0.033 - 0.110 \Delta \text{LGDPPC}_{t-1} + 0.154 \Delta \text{LGDPPC}_{t-2} + 0.034 \Delta \text{TOUR}_{t-1} \\
&\quad \quad \text{(4.065)} \quad \quad \text{(-0.641)} \\
&\quad \quad \text{(1.066)} \quad \quad \text{(2.600)} \\
-0.007 \Delta \text{TOUR}_{t-2} + 0.014 \Delta \text{REXCH}_{t-1} + 0.035 \Delta \text{REXCH}_{t-2} \\
&\quad \quad \text{(-0.550)} \quad \quad \text{(0.548)} \quad \quad \text{(1.367)} \\
-0.004 \text{WAR}_t - 0.027 \text{ECT}_{t-1} \\
&\quad \quad \text{(-0.683)} \quad \quad \text{(-3.393)}
\end{align*}
\]

$R^2 = 0.53$; F-statistics = 4.93

Note: $t$-statistics are in the brackets.

The coefficient of ECT is significant at the 1% level of significance and it has the correct (negative) sign, implying that there is a mechanism to converge such short-run dynamics into long-run equilibrium. The speed of adjustment coefficient of ECT is -0.03, which suggests a slow adjustment process. This estimate is line with some of the other Sri Lankan studies, Srinivasan et al. (2012) and Jayathilake (2013), which also found smaller error correction coefficient. Approximately 3% of the disequilibrium of the previous year’s shock adjusts back to the long-run equilibrium in the current year. Moreover, the coefficient of the dummy

\(^1\) The estimation results of other equations are not provided here but available upon request from the author.
variable, WAR has negative sign, as expected. This means that WAR is harmful to economic growth.

In Table 4, we provide short-run causality (joint $\chi^2$ Wald test for the lagged explanatory variables), long-run causality ($t$-statistics for the coefficients of the ECTs) and strong causality (joint $\chi^2$ Wald test for the ECTs and the explanatory variables). Using the specification in the system of equations, turning to the short-run causality, based on Eq. (2), LTOUR causes LGDPPC. Looking at the long-run causality, the coefficient of ECT is significant in Eq. (2). Hence, LTOUR, LREXCH and WAR cause LGDPPC. Observing the strong causality, (ECTs with LGDPPC, LTOUR and LREXCH as dependent variables), in Eq. (2) LTOUR and LREXCH Granger cause LGDPPC. This means that these two variables bear the burden of the short-run adjustment to long-run equilibrium in the LGDPPC, given a shock to the system.

Overall, the results on short-run and long-run causality suggest that there is a significant dynamic causal relationship among economic growth and tourism. An alternative explanation is that tourism causes economic growth in both short-run and long-run and this gives support for the tourism-led growth hypothesis, in Sri Lanka. Our results is in line with the results reported in previous studies, such as Balaguer and Cantavella-Jorda (2002), Belloumi (2010), Chen and Chiou-Wei (2009), Ghariey (2013), Jayathilake (2013), Katircioglu (2011), Lean and Tang (2010), Tang and Tan, (2015), Trang et al., (2014), and Wickremasinghe and Ihalanayake (2006).

### Table 4: Granger causality results based on VECM

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Short-run causality</th>
<th>Long-run causality</th>
<th>Strong causality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta$LGDPCC</td>
<td>$\Delta$LTOUR</td>
<td>$\Delta$LREXCH</td>
</tr>
<tr>
<td>$\Delta$LGDPCC</td>
<td>-</td>
<td>6.818**</td>
<td>2.001</td>
</tr>
<tr>
<td>$\Delta$LTOUR</td>
<td>2.500</td>
<td>-</td>
<td>0.876</td>
</tr>
<tr>
<td>$\Delta$LREXCH</td>
<td>0.500</td>
<td>0.364</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate statistical significance at the 10% level, 5% level and 1% level, respectively.
Impulse response functions and Variance decompositions

In addition, the causal analyses can be extended to provide more insight into how each shock affects the dynamic path of the system variables by looking at the impulse response functions and variance decompositions. Impulse response functions (IRFs) measure the dynamic marginal effects of each shock on all of the variables over time. Variance decompositions examine how important each of the shocks is as a component of the overall (unpredictable) variance of each of the variables over time.

The graphs in Figure 3(a) -3(c) show the impulse responses of the variables for a ten year period. As can be seen, one standard deviation positive shock to LTOUR and LREXCH results in positive response of LGDPPC for the next ten years (as in Fig.3 (a)). This implies that tourism and exchange rate positively affect economic growth in Sri Lanka. The response of LTOUR for LGDPPC positively impact for the first two years, but then negatively impact afterwards; whereas LREXCH is negative for the first three years, then no change in the behaviour of LTOUR (as in Fig. 3(b)). Moreover, a one standard deviation shock to LGDPPC leads to positive impact on LREXCH while a shock to LTOUR leads to almost no change in the behaviour of LREXCH (as in Fig.3(c)). In summary, the results indicate that economic growth responds positively to a positive shock in tourism and exchange rate throughout period. Moreover, the findings from impulse response functions also show strong supporting evidence for tourism-led growth hypothesis, derived from the VECM.
Figure 3: Impulse responses to one Standard Deviation innovation in VECM

Figure 3(a) Response on GDP per capita to shocks to tourism and exchange rate
Response of LGDPPC to LGDPPC
Response of LGDPPC to LTOUR
Response of LGDPPC to LREXCH

Figure 3(b) Response on tourism to shocks on GDP per capita and exchange rate
Response of LTOUR to LGDPPC
Response of LTOUR to LTOUR
Response of LTOUR to LREXCH

Figure 3(c) Response on exchange rate to shocks on GDP per capita and tourism
Response of LREXCH to LGDPPC
Response of LREXCH to LTOUR
Response of LREXCH to LREXCH
The graphs in Figure 4(a) – 4(c) depict the corresponding Cholesky variance decompositions of the relationship between LGDPPC, LTOUR and LREXCH in Sri Lanka. The results indicate that in addition to the innovations in itself, shock to LTOUR has the strongest explanatory power over the forecast error variance of the LGDPPC, whereas shock to LREXCH has the moderate explanatory power (see Figure 4(a)). Turning to shock to LGDPPC tends to contribute most to the forecast error variance of the LTOUR, whereas shock to LREXCH contributes least to forecast error variance (see Figure 4(b)). Looking at the shock to LTOUR does not have any explanatory power over the forecast error variance of the LREXCH, whereas shock to LGDPPC has the least explanatory power (see Figure 4(c)).

**Diagnostic tests**

Lastly, for diagnostic purposes, normality, serial-correlation and heteroskedasticity tests of the models are conducted. Table 5 presents the diagnostics test results. As can be seen, the tests results show no evidence for serial correlation, heteroscedasticity and non-normality, in the model.

<table>
<thead>
<tr>
<th>Tests</th>
<th>Eq. (2)</th>
<th>Eq. (3)</th>
<th>Eq. (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normality (Jarque - Bera)</td>
<td>0.61</td>
<td>0.72</td>
<td>0.05</td>
</tr>
<tr>
<td>Serial Correlation (Breusch-Godfrey)</td>
<td>0.45</td>
<td>0.06</td>
<td>0.33</td>
</tr>
<tr>
<td>Heteroskedasticity (ARCH)</td>
<td>0.49</td>
<td>0.12</td>
<td>0.76</td>
</tr>
</tbody>
</table>

In addition, the structural stability of the estimated Eq (2) can be seen in the plots of CUSUM and CUSUM of squares (CUSUM2) of recursive residuals, in Figure 6. These plots show that the parameters and error terms of the estimated model is stable as the respective plots do not cross the 5% critical bounds. Hence, the model with LGDPPC as a dependent variable does not have any structural instability, during the sample period.
Figure 4: Variance decomposition in VECM

Figure 4(a) Variance on GDP per capita due to tourism and exchange rate

Figure 4(b) Variance on tourism due to GDP per capita and exchange rate

Figure 4(c) Variance on exchange rate due to GDP per capita and tourism
5. Conclusions and policy implications

In this paper, we analysed the causal relationship between economic growth, tourism and exchange rate and examined the tourism-led growth hypothesis in Sri Lanka for the period 1968-2014, using vector error correction model framework. The Johansen’s multivariate cointegration was performed. The results suggest that a significant long-run equilibrium relationship exists between economic growth, tourism receipts, exchange rate and war. Hence, all of these variables share a common trend in the long-run. In addition, results from both long–run and short-run Granger causality test show that there exists a unidirectional causality relationship from tourism to economic growth. This supports the TLG hypothesis in Sri Lanka.

The policy implications of this study are straightforward. The Sri Lankan government should continue to promote tourism related activities focusing on elevating and modernizing, as well as maintaining a stable political and economic environment. Besides, policymakers should also attempt to maintain a competitive exchange rate.
References:


Khan, H. and Lin, C. (2002). International trade and tourism: evidence from co integration and causality tests by using Singapore data. 33rd Annual TTRA conference, 23–26 June, Virginia, USA.


