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Investigating tourism and exchange rate dynamics on economic growth in Sri Lanka

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ABSTRACT

We re-examine the tourism-growth relationship to interrogate the role of the exchange rate as a future driver of the nexus. Using quarterly data on Sri Lanka from 1995 to 2018, preliminary tests reveal a long-run association among economic growth, tourism expenditures and the official exchange rate. Conclusions drawn from the linear models suggest that a percentage change in tourism expenditures contributes to an increase (between 0.46% and 0.52%) in growth. Likewise, the interaction with the exchange rate improves economic growth more so at the conditional distribution of economic growth (50th and 75th quartile). Additional evidence from the margin plot reveals that the effect of tourism on economic growth is positive as the Sri Lankan *Rupee* depreciates. From the non-linear models, the influence of the exchange rate improves the net effect of tourism on growth. These are novel contributions to the literature as it suggests that currency depreciation in Sri Lanka is pro-growth. Policy recommendations are discussed.

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Introduction

The United Nations 2030 Sustainable Development Goal 8 identifies the tourism sector as a significant driver of growth and socio-economic development. With particular reference to developing economies, the sector plays a fundamental role in creating employment, particularly in the informal sector, it also drives services trade with the resultant multiplier effect on growth. The tourism-growth dynamics is well-established in the literature and the tourism-led growth strand establishes that increase in tourism activities causes a rise in economic growth (Adeleye et al., 2021; Aslan et al., 2020; Canh & Thanh, 2020; Khan et al., 2020b; Romao, 2020), while a strand affirms the tourism-led growth hypothesis (TLGH) (Adedoyin et al., 2021; Balaguer & Cantavella-jordá, 2002; Danish & Wang, 2018; Isik et al., 2018; Liu & Wu, 2019; Obi & Ogeide, 2022).

Similarly, the exchange rate affects international travel and tourism. It is crucial in the determination of tourism flows[1] and outcomes with an impact on economic growth. In

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the relation between tourism and exchange rate, the sector is an important channel through which countries generate immense foreign exchange. The literature (Obi et al., 2016; Obi & Ogeide, 2022) documents that currency valuation is essential in determining a tourist's choice of destination. This makes the exchange rate, which is the price at which domestic currency *exchanges* with a foreign currency, a critical factor in the tourism-growth nexus. It is also an important consideration in international trade because it reflects a country's attractiveness in the international market. In addition, it influences the decision of tourists, determines tourists' expenditures and length of stay in a foreign country (Čavlek & Wanhill, 2014). The empirical connection between tourism and exchange rate is expounded in the literature (Boskurt et al., 2021; Chi, 2020; Isik et al., 2019; Jena & Dash, 2020; Tung, 2019; Zhao, 2020).

This paper expands the tourism literature on Sri Lanka (Gamage et al., 2020; Ganeshamoorthy, 2018; Prakash et al., 2019; Srinivasan et al., 2012). According to the International Trade Administration[2], the tourism sector is the third largest earner of foreign exchange for Sri Lanka. It is estimated that the sector earned around $3.5 billion in 2019. Also, from the Travel & Tourism Competitiveness Report 2019 of the World Economic Forum[3], Sri Lanka ranked 77th out of 141 countries, while India and the People's Republic of China (PRC) contributed the largest number of tourist arrivals, followed by the UK, Germany, and France. Sri Lanka offers a mix of attractions including beaches, wildlife parks, rain forests, tea plantations, ancient ruins, Buddhist cultural sites, and festivals (Gamage et al., 2020; Ganeshamoorthy, 2018; Srinivasan et al., 2012). These perks earned it one of the most visited countries in South Asia (Prakash et al., 2019). In 2019, the country recorded over 1.9 million tourist arrivals, a 21% drop from the previous year.[4] Further worsening the situation is the devastating effects of the coronavirus 2019 which adversely affected the travel and tourism sector globally. Figure 1 shows the trend of per capita GDP, tourism expenditures and exchange change from 1995 to 2019. While economic growth and exchange rate maintain an upward movement, that of tourism expenditures[5] is somewhat inconsistent with swings and a dip around 2011. Hence, this study attempts to interrogate the tourism-growth nexus for Sri Lanka and determine whether the relationship holds when the exchange rate[6] is accounted for? To the best of our knowledge, this is the first study to engage such analysis more so for a developing economy like Sri Lanka. This brings to fore the justification for this study and the lacuna to be filled.

To probe the discourse, quarterly time series data from 1995 to 2018 comprising per capita GDP (a proxy for economic growth), tourism expenditures, official exchange rate and a set of control variables are used. To ensure the robustness of the results a range of econometrics techniques is deployed. The Bayer and Hanck (2013) cointegration test is first used to ascertain if the variables co-exist in the long run after which cointegration techniques of fully modified ordinary least squares (FMOLS) developed by Phillips and Hansen (1990) and the Canonical cointegration techniques are deployed to determine the long-run estimates. To control for possible endogeneity of the tourism variable, the instrumental variable technique nested within the generalised method of moments (IV-GMM) (Baum et al., 2003, 2007a, 2007b) is used. Finally, the bootstrap simultaneous quantile regression (SQREG) method developed by Koenker and Bassett (1978), Koenker and Hallock (2001) and Koenker (2005) is used if the dependent variable has a non-normal distribution. This empirical approach makes the study novel and holistic in

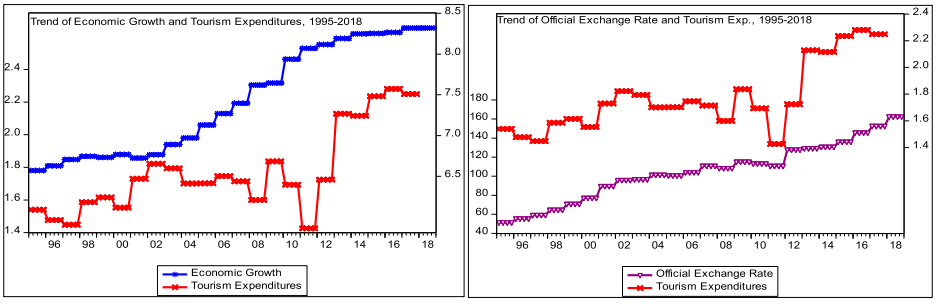


Figure 1. Trend of economic growth, tourism expenditures and official exchange rate in Sri Lanka, 1995–2019. Source: Author's computations.

ensuring a critical examination of its core arguments. The rest of the paper is structured as follows: Literature review and hypotheses section discusses the literature; Data and methodology section outlines the data and empirical model; Results and discussions section discusses the results, and Conclusion and policy recommendations section concludes.

Literature review and hypotheses

The tourism-growth nexus has gathered interest and discourse among researchers on the direction of impact which led to the creation of four hypotheses (Brida et al., 2016; Calero & Turner, 2019; Castro-Nuño et al., 2013; Fonseca & Sánchez Rivero, 2020; Gamage et al., 2020; Gwenhure & Odhiambo, 2017; Li et al., 2018; Nunkoo et al., 2020; Pablo-

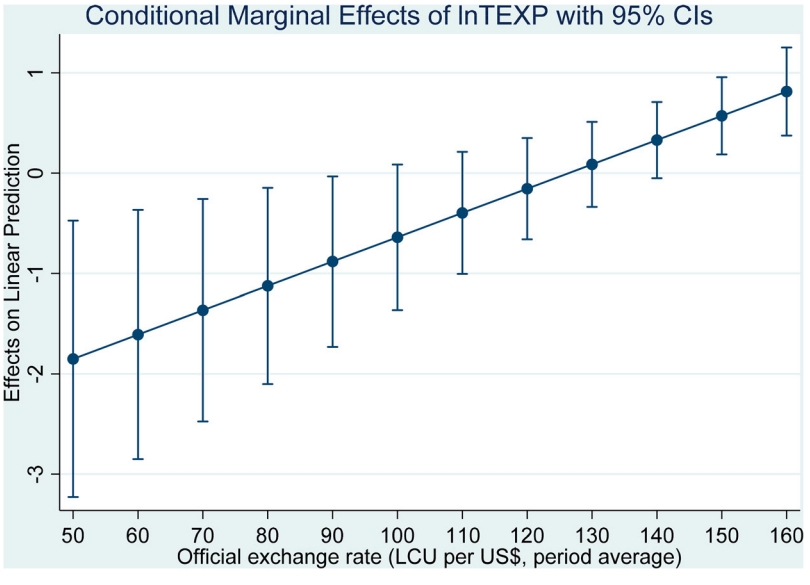


Figure 2. Margin plots of tourism expenditures on economic growth in Sri Lanka, 1995–2018. Source: Authors' computations.

Romero & Molina, 2013). First is the tourism-led growth hypothesis (TLGH) states that tourism activity stimulates economic growth; second is the growth-led tourism hypothesis (GLTH) also referred to as 'conservation hypothesis' which states that tourism growth is triggered by economic growth; third is the feedback hypothesis (FH) where the supposition is that both variables impact each another, and finally the neutrality hypothesis (NH) where the argument is that no causal relationship exists between tourism and economic growth. Without claiming to be exhaustive, past and recent studies on the tourism-growth nexus are reviewed.

Specifically, Srinivasan et al. (2012) used the autoregressive distributed lag (ARDL) method to find that tourism receipts significantly impact economic growth in the long- and short-run in Sri Lanka from 1969 to 2009. Similar to Tang and Tan (2013) who used tourist arrivals and cointegration techniques, Tang and Tan (2015) deploy the vector error correction model (VECM) and Granger causality to find that tourism receipts Granger-cause growth in Malaysia from 1975 to 2011. On a panel of 46 countries, Scarlett (2021) uses the system generalised method of moments to find that tourist arrivals and tourism receipts have a significant positive impact on economic growth but the impact is 50% higher when tourism receipts are the measure of tourism (Saif-Alyousfi & Saha, 2021). In the case of Poland, Croes et al. (2021) use the Limited Information Maximum Likelihood (LIML) to show that tourism specialisation has a short-term effect on economic growth and a negative and indirect link to human development. Using data from 1995 to 2017, Chen et al. (2021) deployed the global vector autoregressive model (GVAR), impulse response and variance decomposition techniques on a panel of Belt Road Initiative (BRI) countries to find that economic growth has significant shock and spill-over effects on international tourism revenue. Also, Tu and Zhang (2020) use a nonlinear threshold analysis on a panel of 75 Chinese ethnic autonomous counties from 2007 to 2016 to find that tourism has a significant nonlinear effect on economic growth (Liu & Wu, 2019). Using a panel data model from 2006 to 2017 on European regions, Romao (2020) finds that tourism demand is positively correlated with economic growth. On a panel of 96 countries from 2000 to 2007, Lv (2020) shows that tourism exhibits a nonlinear U-shaped relation with the informal sector. Khan et al. (2020b) find that a percentage increase in tourist arrivals significantly boosts economic growth by 0.051% in Pakistan from 1995 to 2016 (Khan et al., 2020a). Using a panel of countries, Canh and Thanh (2020) compute an economic vulnerability index (EVI) to show that tourism expenditures have a significant negative effect and a nonlinear U-shape effect on EVI. Finally, Aslan et al. (2020) use the panel quantile regression method on a panel of 17 Mediterranean countries from 1995 to 2014 to establish that the tourism-led growth hypothesis holds. Given the significance of the exchange rate and its ability to tilt tourism flows, revenues and expenditures (Agiomirgianakis et al., 2015; Boskurt et al., 2021; Dincer et al., 2015; Ghartey, 2013; Jena & Dash, 2020; Zhao, 2020), a noticeable gap among the reviewed studies is that none accounted for the role of the exchange rate in the tourism-growth nexus. The fundamental difference between the extant literature and the current study is the incorporation of the exchange rate in the tourism-growth mechanism. Thus, apart from examining the individual effect of tourism and exchange rate on economic growth, the study further examines the interaction effect of exchange rate such that it tests whether the tourism-growth nexus holds when the exchange rate is accounted

for. Consequently, this study relies on the theoretical and empirical expositions to test the following hypotheses:

H_1. There is a significant positive effect of tourism and exchange rate on economic growth.

H_2. The exchange rate influences the effect of tourism on economic growth.

H_3. The net effect of tourism on growth is positive when the exchange rate is accounted for.

Data and methodology

Variables and justifications

The dependent variable is GDP per capita (PC) used as the proxy for economic growth, while tourism expenditures (TEXP) and official exchange rate (OXR) are the key explanatory variables. The study controls for labour participation (LAB), net inflows of foreign direct investment (FDI), and domestic credit (DC). The data used to examine the long-term relations existing among these variables are sourced from the World Development Indicators of the World Bank (2020). The Sustainable Development Goals (SDGs) (https://sdgs.un.org/goals) 8, 12, and 17 of the United Nations 2019 serve as the bases for the choice of variables used in this study. Economic growth (PC) and labour force (LAB): SDG 8 sets out to 'promote sustained, inclusive and sustainable economic growth, full and prod employment and decent work for all'. This goal allows the engagement of the unemployed teeming population for job creation and high-level productivity. Tourism expenditures (TEXP): SDG 8.9 and 12 aim to 'devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products by 2030'. Exchange rate (OXR): Closely linked to SDG 8 the exchange rate policy of developing economies must be guided by sustainable strategies to achieve rapid and inclusive pro-poor economic growth while enhancing international affordability and tourism activities. Foreign direct investment (FDI): SDG 17 pioneers 'a vision improved and more equitable trade, as well as coordinated investment initiatives to promote sustainable development across borders'. The tourism sector requires huge capital and infrastructural outlay and this goal encourages the transfer of investments and expertise from developing to less developed economies and across borders. Domestic credit (DC): making finance available to those initially excluded is one of the targets of SDG 17. This will spur financial deepening which creates avenues for investment and aggregate consumption that engenders economic growth. We expect that these explanatory and control variables will be a positive impact on economic growth. Table 1 describes the variables and the expected a priori signs.

Table 1. Variables and expectations.

Variables	Description	Expected signs
PC	GDP per capita (current US$)	N/A
TEXP	International tourism, expenditures (% of total imports)	+
OXR	Official exchange rate (LCU per US$, period average)	+
LAB	Labour force participation rate, total (% of total population ages 15-64)	+
FDI	Foreign direct investment, net inflows (BoP, current US$)	+
DC	Domestic credit to the private sector (% of GDP)	+

Note: Not applicable.
Source: Authors' compilation.

To analyse the nexus, quarterly[7] frequency data beginning from 1995 to 2018 are used. To control for heteroscedasticity, and possible outliers and to establish elasticity relationships, the variables, except for exchange rate, are transformed to their natural logarithms. Table 2 presents the descriptive statistics and pairwise correlation of the variables. All the variables except for the labour force show a statistically significant positive association with economic growth. Also, the observed correlation coefficient of 0.872 for OXR/FDI does not seem to bias the results as the variance inflation factor is 4.25 which is below the allowed threshold of 10 from where multicollinearity becomes a concern.

Theoretical and conceptual framework

This study incorporates the exposé on the tourism-led growth hypothesis (TLGH) of Balaguer and Cantavella-jordá (2002) which hypothesises the theoretical and empirical link between inbound tourism and economic growth (Brida et al., 2016). The TLGH extends from the export-led growth hypothesis (ELGH) which states that economic growth is a function of primary factors of production (labour and capital) and an increase in exports. Thus, tourism is viewed as a form of a non-traditional type of export given its revenue-generating potential and the ability to stimulate domestic consumption which aids economic growth through multiplier effects. Equivalent to the ELGH, the TLGH examines the possible relationships between the tourism sector and economic growth. Several studies (Calero & Turner, 2019; Chen et al., 2021; Fonseca & Sánchez Rivero, 2020; Khan et al., 2020a; Scarlett, 2021; Tang & Tan, 2015; Tu & Zhang, 2020) commonly evaluate this nexus by regression analysis or the Granger no-causality approach (Granger, 1969; Granger, 1988). This conjecture is supported by the 'new growth' theory of Balassa (1978) which submits that exports impact economic growth by two key channels. The first is by improving productivity in the allocation of the factors of production and the second is by expanding their respective volume.

Table 2. Summary statistics and pairwise correlation.

Variable	PC	TEXP	OXR	LAB	FDI	DC
Observations	96	92	96	96	96	88
Mean	2073.166	6.078	104.412	59.438	5.52E+08	32.387
Standard Deviation	1291.503	1.703	30.194	1.498	4.10E+08	4.565
Minimum	714.233	4.161	51.252	56.801	55995588	25.516
Maximum	4104.631	9.79	162.465	63.411	1.61E+09	45.368
Correlation analysis	[1]	[2]	[3]	[4]	[5]	[6]
(1) lnPC	1.000					
(2) lnTEXP	0.686***	1.000				
(3) OXR	0.916***	0.810***	1.000			
(4) lnLAB	−0.787***	−0.522***	−0.734***	1.000		
(5) lnFDI	0.907***	0.554***	0.872***	−0.676***	1.000	
(6) lnDC	0.545***	0.649***	0.596***	−0.551***	0.493***	1.000

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ln = natural logarithm; PC = GDP per capita; TEXP = tourism expenditures; OXR = Official exchange rate; LAB = labour force; FDI = foreign direct investment net inflows; DC = domestic credit; Example: 5.52E+08 = 552,000,000.00.
Source: Authors' computations.

Empirical model and approach

The functional form of the model that addresses the conjecture that tourism and exchange rate individually impact economic growth is expressed linearly as follows:

$$\ln PC_t = \eta + \xi_1 \ln TEXP_t + \xi_2 OXR_t + \xi_e \boldsymbol{Z}'_t + e_t \quad (1)$$

However, this study hypothesises that the relationship between tourism and economic growth is nonlinear through the influence of exchange rate. The conjecture is that the impact of tourism on economic growth is conditioned on the level of the exchange rate. To this end, Equation (1) is augmented to include an interaction term of tourism and exchange rate and the model becomes:

$$\ln PC_t = \varphi + \omega_1 \ln TEXP_t + \omega_2 OXR_t + \omega_3 (\ln TEXP_t * OXR_t) + \omega_4 \boldsymbol{K}'_t + \nu_t \quad (2)$$

From Equations (1) and (2), η and φ represent the constant terms while ξ_i is the partial slope coefficient; ω_1 is the unconditional effect of *TEXP* on *PC*; ω_3 is the conditional effect of $TEXP_t * OXR$; $\boldsymbol{Z}'_t$ and $\boldsymbol{K}'_t$ represent the vectors of control variables (*LAB*, *PC*, and *DC*) in natural logarithms; ν_t and e_t represent the general error terms.

It is important to emphasise that Equation (1) is a linear specification that depicts the marginal effect of exchange rate and tourism on economic growth, holding other factors constant. Equation (2) that addresses the core of this study is a *nonlinear* specification that shows the *conditional* effect of tourism on economic growth. The nonlinearity is captured by the inclusion of the multiplicative term $(\ln TEXP_t * OXR_t)$. That is, Equation (2) examines the effect of tourism on economic growth when the exchange rate is accounted for. To illustrate this, the sign of the coefficient of the interaction term, ω_3 evaluates if the interaction of *TEXP* and *OXR* enhances or distorts the effect of tourism expenditures on economic growth. Hence, the net effect of *TEXP* on economic growth is computed as follows:

$$\frac{\partial \ln PC}{\partial \ln TEXP} = \omega_1 + \omega_3 OXR \quad (3)$$

Following Adeleye et al. (2022), Equation (3) states that the effect of *TEXP* on economic growth is contingent on its coefficient (ω_1), the coefficient of the interaction term (ω_3), and the value of *OXR*. If ω_1 is positive, a positive (negative) ω_3 indicates that the interaction of *TEXP* and *OXR* amplifies (reduces) the effect of tourism expenditures on economic growth. Similarly, if ω_1 is negative, a positive (negative) ω_3 indicates that the interaction *reduces* (strengthens) the worsening effect of tourism expenditures on economic growth. Finally, $\omega_3 = 0$ is an indication that the interaction has no significant effect on economic growth. We test these statements at the mean, minimum and maximum values of *OXR*.

Next, the stationarity properties of the variables are examined using the conventional Dickey and Fuller (1979) and Phillips and Perron (1988) unit root tests. Having confirmed that all the variables are stationary after the first difference (Table 3), the Bayer and Hanck (2013) cointegration test is deployed to determine if all the variables co-habit in the long run.

The Bayer-Hanck test uses stationary variables and integrates the Engle and Granger (1987), Johansen (1991), error correction *F*-test of Boswijk (1995) and the error correction *t*-test of Banerjee et al. (1998), to determine if cointegration exists among the variables. The null hypothesis is that there is no cointegration while the alternative states

Table 3. Unit root tests.

	PP			ADF		
Variables	Level	1st diff.	Decision	Level	1st diff.	Decision
lnPC	−0.242	−11.051***	*I*(1)	−0.256	−8.453***	*I*(1)
lnTEXP	−0.925	−9.485***	*I*(1)	−0.919	−6.669***	*I*(1)
OXR	−0.134	−11.130***	*I*(1)	−0.140	−8.559***	*I*(1)
lnLAB	−1.221	−9.616***	*I*(1)	−1.207	−6.734***	*I*(1)
lnFDI	−1.884	−9.852***	*I*(1)	−1.1915	−6.990***	*I*(1)
lnDC	−0.572	−9.249***	*I*(1)	−0.557	−6.493***	*I*(1)
Cointegration hypotheses:						
Bayer-Hanck Test (EG-J-Ba-Bo-): 17.385*						

Note: *** $p < 0.01$; ln = Natural logarithm; PC = GDP per capita; TEXP = Tourism expenditures; OXR = Official exchange rate; LAB = Labour force; FDI = Foreign direct investment net inflows; DC = Domestic credit; Bayer and Hanck (2013) 10% critical values = 15.804; EG = Engle-Granger; J = Johansen; Ba = Banerjee; Bo = Boswijk.
Source: Authors' computations.

otherwise. Fisher's equation is presented as follows:

$$EG - JOH = -2[\ln(P_{EG}) + (P_{JOH})] \tag{4}$$

$$EG - JOH - BO - BDM = -2[\ln(P_{EG}) + (P_{JOH}) + +(P_{BO}) + +(P_{BDM})] \tag{5}$$

From (4) and (5), P_{EG}, P_{EG}, P_{EG}, and P_{EG} the significance levels of Engle and Granger (1987), Johansen (1991), the error correction *F*-test of Boswijk (1995) and the error correction *t*-test of Banerjee et al. (1998), respectively. The decision criteria are as follows: if the absolute value of the computed Fisher (1932) statistic is greater than the critical values reported by Bayer and Hanck (2013) combined statistics, then the hypothesis of no cointegration is rejected. Cointegration is confirmed since the Bayer-Hanck statistic of 17.385 is greater than the critical value of 15.804 at the 10% significance level (see below the panel of Table 3).

Having established that a cointegration relationship exists, the need to estimate the long-run coefficients becomes relevant. To this end, the fully modified ordinary least square (FMOLS) proposed by Phillips and Hansen (1990) is deployed. The technique uses kernel estimators of the nuisance parameters that affect the asymptotic distribution of the OLS estimator (Adusei, 2013). It achieves asymptotic efficiency by modifying the least squares to account for serial correlation effects and tests for the endogeneity in the regressors that results from cointegrating relationships. As a further robustness check, the Canonical cointegration method is used to confirm if the results are sustained. Furthermore, if tourism expenditures are endogenous, that is, correlated with the error term such that the outcomes are biased and may yield wrong inferences, the instrumental variables techniques proposed by Phillips and Hansen (1990) and recently nested within the generalised method of moments (GMM) framework by Baum et al. (2003, 2007a, 2007b) are deployed. Finally, if economic growth does follow a normal such that the impact of TEXP and OXR and other control variables change along the conditional distribution of PC, it becomes pertinent to deploy a suitable technique that models this scenario. The most appropriate is the quantile regressions proposed by Koenker and Bassett (1978), Koenker and Hallock (2001) and Koenker (2005). This technique is also more robust in the presence of outliers or weaker linear correlation between variables (Brida et al., 2020).

Results and discussions

Restricting interpretations to the variables of interest – TEXP and OXR – Table 4 reveals harmonised cointegration regression regressions from FMOLS and Canonical techniques. The results of the linear relationship (columns [1] and [3]) indicate that in the long-run TEXP is positive and significant at the 10% level. It implies that in the long run, a percentage change in tourism expenditures weakly stimulates economic growth by 0.49% and 0.47%, on average, *ceteris paribus*. This outcome corroborates previous studies that tourism has growth-enhancing properties (Anser et al., 2021; Canh & Thanh, 2020; Khan et al., 2020a; Obi & Ogeide, 2022; Scarlett, 2021; Scheyvens et al., 2021). However, note that the estimate of the linear impact of OXR on growth is not very precise, and cannot be distinguished from zero. This outcome is contrary to related studies that find a significant relationship between exchange rate and economic growth (Agiomirgianakis et al., 2015; Chi, 2020; Dincer et al., 2015; Durusoy & Beyhan, 2015).

From columns [2] and [4], the interaction effect of *TEXP*OXR* is positive and statistically significant at the 5% level. This paper's novel contribution hinges on evaluating the net effect of tourism on economic growth at different values of the exchange rate.[8] The computation of the net effect of tourism at the mean value of exchange rate for the FMOLS model:

$$\frac{\partial \ln PC}{\partial \ln TEXP} = -2.970 + (0.024 * 104.41) = -2.970 + 2.506 = -0.46 \tag{6}$$

and for the Canonical model:

$$\frac{\partial \ln PC}{\partial \ln TEXP} = -2.907 + (0.023 * 104.41) = -2.907 + 2.401 = -0.51 \tag{7}$$

Table 4. Long-run cointegration results (Dep Var: lnPC).

Variables	FMOLS				Canonical			
	Coefficient	*t*-Stat	Coefficient	*t*-Stat	Coefficient	*t*-Stat	Coefficient	*t*-Stat
	[1]		[2]		[3]		[4]	
lnTEXP	0.493*	1.95	−2.970**	−2.07	0.473*	1.88	−2.907*	−1.97
OXR	0.002244	0.67	−0.026**	−2.05	0.003	0.79	−0.025*	−1.92
lnLAB	−10.491***	−5.48	−5.907**	−2.53	−10.239***	−5.54	−5.808**	−2.52
lnFDI	0.467***	5.78	0.308***	3.32	0.461***	5.94	0.308***	3.32
lnDC	−0.687**	−2.10	−0.913***	−2.93	−0.661**	−2.04	−0.898***	−2.92
lnTEXP*OXR			0.024**	2.39			0.023**	2.26
N/E Mean OXR			−0.46%				−0.51%	
N/E Min. OXR			−1.74%				−1.73%	
N/E Max. OXR			0.93%				0.83%	
Constant	42.353***	5.03	32.120***	3.94	41.351	5.094***	31.554***	3.99
Observations	87		87		87		87	
R-squared	0.910		0.924		0.912		0.925	
Long-run variance	0.078		0.064		0.078		0.064	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ln = Natural logarithm; PC = GDP per capita; TEXP = Tourism expenditures; OXR = Official exchange rate; LAB = Labour force; FDI = Foreign direct investment net inflows (BoP, current); DC = Domestic credit; Long-run covariance estimate (Pre-whitening with lags = 1, Bartlett kernel); FMOLS = Fully modified ordinary least squares; N/E = Net Effect.
Source: Authors' computations.

The striking inference deduced from equations (6) and (7) is that the interaction with the exchange rate reduces the devastating effect of tourism expenditures from −2.970% and −2.907% to −0.46% and −051%, respectively. Cursory observation shows that the exchange rate reduces the negative impact (−1.74% and −1.73%) at minimum values and overturns the negative impact (0.93% and 0.83%) at maximum values. The interpretation of the results follows. Equation (3) shows the net effect of tourism on economic growth. For instance, −0.46% and −051% are the calculated net effect of tourism on economic growth. The negative values suggest that tourism expenditure is associated with reducing economic growth when the exchange rate is at its mean value. The results further indicate that at the minimum (low) value of the exchange rate, the effect of tourism on growth is negative, while it is positive at the maximum (high) value of the exchange rate. The practical understanding of this result is that when inbound tourists arrive in Sri Lanka, they swap their United States dollars for rupees. If they get more rupees from exchanging a US dollar, then the rupee is considered depreciated causing the tourists to spend more, boosting the economy of Sri Lanka. However, if the tourists get a few rupees from a US dollar, then the exchange rate is considered appreciated stifling spending which contracts the economy. In other words, appreciation of the Sri Lankan rupee causes goods and services to be expensive which curtails spending while depreciation makes goods and services cheaper making inbound tourists spend more. Overall, the magnitude of influence of OXR is huge and affirms that it is crucial to account for it when constructing tourism and economic growth models. This is a significant addition to the tourism literature and confirms that the economic growth in Sri Lanka is tourism-led.

Additional robustness checks are engaged with the IV-GMM and IV-2SLS techniques. Accounting for possible endogeneity of the tourism variable and heteroscedasticity in the models, the results in Table 5 for the most part uphold those of Table 4. The results show that a percentage increase in tourism expenditures is associated with a 0.52% and 0.46% increase in economic growth. Supporting previous studies (Agiomirgianakis et al., 2015; Boskurt et al., 2021; De Vita, 2014; Zhao, 2020), the results show that OXR stimulates economic growth by 0.006%, on average, *ceteris paribus*.

On the nonlinear effect of TEXP when OXR is accounted for, outcomes show that the interactions of both variables exert growth-enhancing properties at the 1% significant level. Also, using the mean values of OXR, the computation of the net impact shows that the negative effect of tourism is reduced from −13.523% to −3.40% and from −4.297% to −0.22%. Again, the critical role of the exchange rate in the tourism-growth nexus is validated. Again, these results sustain the tourism-led growth hypothesis in Sri Lanka. To support the analytical evidence displayed in Tables 4 and 5, we plot the marginal effect of tourism on economic growth. Recall that the marginal effect informs how the outcome variable responds to changes in the explanatory variable and provides a good estimate of the amount of change in the dependent variable that is observed due to a change in the independent variables. For continuous variables, the marginal effect measures the instantaneous rate of change. As shown in Figure 2, the margin plot reveals some informative behaviour of economic growth to tourism at different points of the exchange rate. As shown in Table 2, the range of exchange rate is between 51.25 and 162.47 split across an interval of 10, the marginal effect of tourism on economic growth conditioned on the values of the exchange rate indicates that the effect of tourism on economic growth improves as the Sri Lankan *Rupee* depreciates.

Table 5. Instrumental variables results (Dep Var: lnPC).

	IV-GMM (Linear)		IV-2SLS (Linear)	
Variables	Coefficient [1]	*t*-Stat	Coefficient [2]	*t*-Stat
lnTEXP	0.518***	2.73	0.460***	2.63
OXR	0.006*	1.68	0.006***	2.75
lnLAB	−7.968***	−4.78	−7.787***	−6.45
lnFDI	0.409***	5.11	0.4***	7.7
lnDC	−0.626***	−3.82	−0.564***	−2.69
Constant	32.564***	4.54	31.848***	6.02
Observations	87		87	
R-squared	0.919		0.92	
Chi-square	1239.89***		1004.69***	
	IV-GMM (Non-linear)		IV-2SLS (Non-linear)	
Variables	Coefficient	*t*-Stat	Coefficient	*t*-Stat
lnTEXP	−13.523***	−2.94	−4.297***	−2.75
OXR	−0.11***	−2.87	−0.069***	−2.94
lnTEXP*OXR	0.097***	3.04	0.039***	3.11
lnLAB	7.937	1.63	−10.923***	−5.06
lnFDI	−0.209	−0.93	0.594***	8.75
lnDC	−1.257***	−3.64	−1.277***	−6.83
N/I Mean OXR	−3.40%		−0.22%	
N/I Min. OXR	−8.55%		−2.30%	
N/I Max. OXR	2.24%		2.04%	
Constant	0.639	0.06	52.306***	6.11
Observations	87		87	
R-squared	0.831		0.965	
Chi-square	1007.263***		1775.864***	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; ln = Natural logarithm; PC = GDP per capita; TEXP = Tourism expenditures; OXR = Official exchange rate; LAB = Labour force; FDI = Foreign direct investment net inflows; DC = Domestic credit; N/I = Net Impact.
Source: Authors' computations.

The upward trend in the plot within the 95% confidence interval shows that currency depreciation enhances the impact of tourism on economic growth. However, the effect is not statistically significant between the 110 and −130 band, the effect is mostly positive across the horizon of the exchange rate. This plot supports the econometric results obtained in Tables 4 and 5 where the positive effect of the exchange rate on the tourism-growth nexus is evident at the maximum values of the exchange rate (deprecation). This is a significant contribution to the literature as it suggests that currency depreciation in Sri Lanka is pro-growth.

Finally, we account for the non-normal distribution of economic growth such that the impact of the regressors varies across its distribution. To this end, we analyse the impact along the quartiles of economic growth and the results from the bootstrap simultaneous quantile regression are presented in Table 6. At the lowest quartile of 0.25, the impact of TEXP is inconclusive as it is not different from zero, while OXR shows a positive and significant impact at 10%. The interaction effect is also positive and significant. The net impact shows that OXR shrinks the devastating effect of TEXP at its mean and minimum values, while it erases it at its maximum values.

At the median ($Q = 0.50$) of economic growth, TEXP shows a growth-inducing impact of 0.96%, while the impact of OXR is not different from zero. The interaction effect, though positive, is now weakly significant at the 10% level and across all the values of OXR, the net impact of TEXP on growth is positive. At the 75th quartile, TEXP increases

Table 6. Bootstrap simultaneous quantile analysis results (Dep Var: lnPC).

Variables	Equation [1]	Equation [2]	Net impact of tourism on growth		
	$Q = 0.25$		@ Mean OXR	@ Min OXR	@Max OXR
lnTEXP	0.265 (0.6)	−3.998*** (−3.08)	−1.28	−2.67	0.23
OXR	.013* (1.76)	−0.015 (−1.24)			
lnTEXP*OXR		0.026*** (2.95)			
lnLAB	−8.295** (−2.61)	−5.503 (−1.14)			
lnFDI	.333** (2.26)	0.059 (0.34)			
lnDC	-.861** (−2.08)	−0.89*** (−5.15)			
Constant	35.746*** (2.65)	35.533* (1.79)			
$Q = 0.50$			@ mean OXR	@ min OXR	@max OXR
lnTEXP	.955*** (2.98)	−2.793 (−1.26)	2.71	1.33	4.22
OXR	−0.001 (−0.16)	-.034* (−1.69)			
lnTEXP*OXR		0.026* (1.73)			
lnLAB	−9.789*** (−3.31)	−6.573 (−1.28)			
lnFDI	.521*** (3.97)	0.431** (2.26)			
lnDC	-.728** (−2.41)	−0.844*** (−2.93)			
Constant	38.054*** (2.96)	32.237* (1.67)			
$Q = 0.75$			@ mean OXR	@ min OXR	@max OXR
lnTEXP	0.637** (2.57)	−6.000*** (−2.96)	−0.78	−3.44	2.12
OXR	−0.005 (−0.98)	-.077*** (−3.74)			
lnTEXP*OXR		0.05*** (3.44)			
lnLAB	−13.551*** (−4.87)	−6.243* (−1.96)			
lnFDI	0.622*** (4.40)	0.519*** (4.88)			
lnDC	-.617** (−2.48)	−1.125*** (−6.01)			
Constant	52.17*** (4.52)	35.869*** (3.18)			

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; t-statistics in parenthesis; ln = Natural logarithm; PC = GDP per capita; TEXP = Tourism expenditures; OXR = Official exchange rate; LAB = Labour force; FDI = Foreign direct investment net inflows; DC = Domestic credit.
Source: Authors' computations.

growth by 0.64%, while the effect of OXR is zero. A positive interaction effect is evident and statistically significant at the 1% level and, as previously established, OXR improves the net impact of TEXP on growth. The significant changes in the impact of these variables on growth justify the engagement of a quantile analysis and conclusively asserts that the tourism-led growth hypothesis holds.

Conclusion and policy recommendations

Aligning with the 2030 United Nations Sustainable Development Goal 8, this study uses per capita GDP, tourism expenditures and official exchange rate to probe the tourism-growth relationship in Sri Lanka and to establish if the supposition holds when the exchange rate is accounted for. With quarterly data from 1995 to 2018, consistent robustness results from cointegration, instrumental variables and bootstrap simultaneous quantile techniques (FMOLS, Canonical, IV-GMM, IV-2SLS, and BSREG) validate that growth is tourism-driven as tourism contributes between 0.46% and 0.96% to growth. The results further indicate that the interaction effect is positive to stimulate economic growth. Finally, across all nonlinear model specifications, the exchange rate plays a crucial role in reducing the negative impact of tourism on growth and also overturned the negative impact to positive outcomes in several models. These findings reveal that the exchange rate is a critical factor in economic growth and that tourism and exchange have a symbiotic complementary relationship.

Having established the growth-enhancing impact of tourism and the exchange rate, some policy recommendations are made. Since tourism can bring about both investment and trade opportunities, the government of Sri Lanka may seek out new areas and islands for tourism development. To make Sri Lanka an attractive choice destination for tourists, the government and private sector will need to invest in infrastructural development which, in the process, may facilitate trade (local and international). For instance, the beach areas in Eastern Sri Lanka offer significant potentials that may drive tourists' inflows. These areas are considered world-class, especially locations such as Pasekudah and Arugam Bay which are foremost destinations for holidaymakers who are surfing enthusiasts. Furthermore, the government can initiate eco-friendly policies that will promote wildlife and forests which are regarded as prime tourist locations. The development of these tourists sites can also lead to the initiation of trade relationships where equipment may need to be imported. Also, the exchange rate can considerably influence tourists' decisions on whether to go on international vacation or not. Hence, a favourable exchange rate may act as the immediate stimulus that tourists require to plan their trips while taking cognizance of their expenditures and length of stay. In conclusion, as a way of revamping the economy after the devastating effect of the coronavirus 2019 (COVID-19) pandemic, it becomes germane for the Sri Lankan to look toward developing the tourism sector for greater gains.

Notes

1. 'a weaker currency attracts people to your country and prevents you from travelling' culled from https://destinationsinternational.org/currencies-and-tourism
2. https://www.trade.gov/country-commercial-guides/sri-lanka-travel-and-tourism
3. https://www.weforum.org/reports/the-travel-tourism-competitiveness-report-2019
4. https://www.trade.gov/country-commercial-guides/sri-lanka-travel-and-tourism
5. From World Bank (2022) World Development Indicators, International tourism, expenditures (% of total imports) is defined as follows: International tourism expenditures are expenditures of international outbound visitors in other countries, including payments to foreign carriers for international transport. In other words, this composite variable captures the spendings/expenditures of inbound tourists to Sri Lanka, among others.
6. In this paper, the exchange rate is expressed as the local currency per the Sri Lankan Rupee. An increase in the exchange rate indicates the appreciation of the Sri Lankan Rupee against the foreign currency.
7. For empirical analysis, the study uses the interpolation technique in Stata 16 to convert the annual data of into quarterly data. This method was followed by McDermott and McMenamin (2008) and Akadiri et al. (2020).
8. The mean, minimum, and maximum values of exchange rate are 104.41, 51.25, and 162.47, respectively.

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No potential conflict of interest was reported by the author(s).

Data availability statement

Data will be made available upon request.

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