Tourism and Economic Growth in South Asian Countries: Asymmetric Analysis and Lessons for Mitigating the Adverse Effects of Covid-19 Pandemic

Makun, Keshmeer and Jayaraman, TK

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T.K. Jayaraman
Department of Economics, International Research Collaborative Program, University of Tunku Abdul Rahman, Kampar, Perak, Malaysia. Email: tkjayaraman@yahoo.com

Keshmeer Makun
School of Accounting, Finance and Economics, University of the South Pacific, Suva, Fiji. Email: keshmeer.e.makun@usp.ac.fj

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Abstract

Since the first Quarter of 2020, due to the spread of the Covid-19 pandemic, which is still continuing unabated with the periodical emergence of new variants, international tourism has become one of the most adversely affected sources of external earnings of developing countries. The World Travel and Tourism Council has predicted that border closures, as part of travel bans imposed by all affected countries to contain spread of the pandemic combined with the shattered travelers' confidence, would lead to a loss of 100 million jobs on a global scale in 2021 and 2022 along with an expected fall in world tourism by 60 to 80 percent. For the South Asian countries, the crisis would result in a 42 to 60 percent drop in tourist arrivals in 2020 and 2021. Tourism has also been providing a great impetus to the growth of informal sector supported by information and communication technology with participation of women, both full time and part time, in significant number of small and mini-enterprises. This panel study employing a nonlinear econometric methodology confirms the existence of an asymmetric association between tourism and economic growth for six South Asian countries for the period 1995 to 2018. While a given size of positive partial sum decomposition of tourism increased growth, the negative partial sum decomposition of tourism of the same size resulted in a greater adverse effect on economic growth. There are some lessons of policy implications which are drawn from the study in the context of continuing uncertainties.

Key Words: Tourism, economic growth, Covid-19, nonlinear panel ARDL, South Asia.
JEL Codes: F4, L83, O11, Z3.

1. Introduction

The rapid spread of the Covid-19 pandemic, which began in the first quarter of 2020 and engulfed the world by mid-2020, is still continuing uncontrolled with the emergence of newer mutations and variants more transmissible in nature from December 2020. Both the developed and developing countries have been struggling to contain the onslaught of the virus which resulted in substantial loss of lives and livelihoods. After nine months of research in 2020, well-known international pharmaceutical companies came up vaccines, which were introduced towards the end of 2020 by advanced countries in United States of America and Europe. However, the tasks of logistics involved in storage and delivery in time to the needed locations and ensuring access to all both in the developed and developing countries in two doses appear to be enormous.

The International Monetary (IMF) Fund in its World Economic Outlook of October 2020 (IMF 2020) cautioned that return to normalcy would be "a long ascent back to pre-pandemic levels of activity". This was further confirmed by World Bank in late December 2020. An updated study by World Bank (2020) indicated that it would take two to three years for global output to return to pre-pandemic levels as developing nations slowly climb out the Covid-19 slump with the help of vaccines (Wall Street Journal, 2020). The growth projections[1] are: (i) global output would

[1] The updated projections for 2020 and 2021 by Asian Development Bank (ADB) are that the global loss of GDP would be of 5.5 percent to 8.5 percent of GDP in 2020 and 3.6 percent to 6.3 percent of GDP in 2021 (ADB, 2020).

decline by 4.4 percent in 2020; (ii) output of advanced economies decline by 5.8 percent; and (iii) output in emerging and developing countries in Asia by 1.7 percent (International Monetary Fund, 2020).

In South Asia, the effects of domestic supply shocks and demand shocks emanating from the Covid-19 pandemic have been severe. They resulted from fall in domestic employment due to declining demand for manufactured consumer goods and agricultural produce including vegetables and fruits as well as stoppage of housing and other construction activities. They contributed to a steep decline in incomes consequent to lay-offs and return of the urban based labour back to villages of origin. Besides the conventional shocks in trade in goods and services and fluctuations in foreign direct investment, there are two more external supply shocks of importance to developing countries. These relate to: (i) remittances from their citizens, residing and working overseas in advanced countries; and (ii) earnings from international tourism activities. It is estimated that Covid-19 would cause remittances to decline by 14 percent in 2021 relative to 2019 pre-Covid-19 level. For South Asia region, it is estimated to decline by 22 percent to US$109 billion in 2020, following 6.1 percent growth in 2019.

In regard to tourism, preliminary results of an International Monetary Fund staff study (Behsudi 2020) indicate that disruption in air traffic resulting in suspension of air flights and government restrictions on travel to minimize the spread of pandemic, combined with the shattered travelers confidence had already reduced global tourist arrivals by 65 percent in the first half of 2020. The decrease in international travel and tourism is unprecedented compared to the estimated 8 percent during the global financial crisis and 17 percent amid the SARS epidemic of 2003. The IMF staff study (Behsudi, 2020)) further indicates global tourism earnings are not expected to recover to 2019 levels until 2023. The decline in international travel and tourism has virtually shut down the tourism and hospitality industry, causing substantial adverse social and economic impact on economic growth and welfare of the nations.

This paper takes up a study of six out of the eight South Asian countries, which are also the members of the official inter-governmental organization, known as South Asian Association of Regional Cooperation (SAARC) to examine the economic impact of the pandemic on tourism. The study does not cover two countries, which are Afghanistan and Maldives. While Afghanistan's tourism data series are incomplete, Maldives, an island nation of atolls in the Indian Ocean is an outlier. With no significant agricultural and mineral resources, except sun, surf and sand, Maldives depends heavily on tourism whose share in the gross domestic product (GDP) is about 58 percent, compared to other six member countries. The shares of tourism in GDPs of Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka are small, unlike that of Maldives, as they range from 2 percent in Bangladesh to 11 percent in Sri Lanka[2].

The specific objective of the paper is to undertake a panel study of the six south Asian countries, covering a period of 23 years (1995 to 2017), for which data series on relevant variables

[2]ADB (2020) categorizes tourism dependent Asian economies into four: (i) highly dependent, if tourism share in GDP is more than 10 percent; (b) tourism dependent if tourism share is 5 to 10 percent; (c) major tourism dependent if tourism share is 2.5 to 5 percent of GDP; and (d) minor tourism dependent if tourism share in GDP is less than 2.5 percent. Accordingly, Maldives and Sri Lanka are considered highly tourism dependent; Bhutan and Nepal are major tourism dependent; and Afghanistan, Bangladesh and India are minor tourism dependent.

including capital stock are complete and available, with a view to investigating the existence of any asymmetric relationship between tourism and growth, which is now supported by information communications and technology (ICT). The latter has revolutionized tourism industry by facilitating faster and smoother booking by a click of the mouse, not only for conventional travel and accommodation for luxury hotels and resorts, which are for the rich and retired seniors, but also for medical tourism, besides new products such as cheaper home stays, ecotourism by the young and adventurous, tours of historical and religious nature. The new products are more in the hands of small and medium enterprises, increasingly handled by part time women entrepreneurs (World Bank, 2018a).

The study employs the neoclassical growth model of Solow (1956) to examine the growth in per capita real GDP with real capital stock per capita as fundamental variable and tourism as a conditional variable and ICT as contingent factor. Unlike the conventional studies on tourism and growth nexus, which assume symmetric relationship, our study distinguishes positive shocks from negative shocks and seeks to examine the outcomes along the lines of Shin et.al (2014) and Yilanci and Aydin (2017).

The paper is organized along the following lines: the next section presents a brief review of literature review; the third section looks at trends in tourism and increasing support from the spread of ICT; the fourth section outlines the theoretical framework, data and methodology employed in the study. The fifth section reports results and discussion, and the sixth section presents conclusions and policy recommendations.

2. Literature review[3]

There has been a notable increase in the number of studies, both descriptive and empirical, since the late 1990s, as the world began to witness sustained economic growth facilitated by globalization resulting in rising number of international traveler's. Earlier studies before the New Millennium dealt with tourism in the developed countries. They were followed by studies later on the island countries in the Caribbean and the South Pacific regions, which Indian Ocean island countries.

These studies were of two categories: (i) country specific and (ii) panel and cross-country. While the country specific studies are simple straight forward, where only variables included change over time, the panel studies have, however, some restrictive assumptions,. They assume economic backgrounds and other characteristics of the countries included are homogeneous, at least to start with. Some examples of country-specific studies on tourism and growth are Durbarry (2004) for Mauritius; Nowak et al. (2007) for Spain; Kumar (2014b) for Kenya; Ishikawa and Fukushige (2007) for Japan; Katircioglu (2009), for the Turkish; Dritsakis (2004) for Greece; and Shareef and McAleer (2007) for the Maldives. Examples of panel studies include Wu et al. (2018); Holzner (2010); Kumar and Kumar (2013); Lee and Chang (2008); Narayan et al. (2010); Roque and Raposo (2016) and Seetanah (2011). Notable empirical studies test the relationship between tourism and growth include Balaguer and Cantavella-Jorda (2002), Cortez-Jimenez and Paulina (2006), Lee and Chang (2008), Narayan et al., (2010), Tang and Tan

[3] This section draws heavily upon the literature review from Jayaraman and Makun (2020).

(2015); Stauvermann et al., (2018). They conclude that international tourism promotes long term economic growth. Some studies such as Aslan (2013) and Payne and Mervar (2010), amongst others,show evidence that tourism development occurs as result of economic development. Some empirical studies, which show the existence of bidirectional causality between tourism and economic growth, include Durbarry (2004); Seetanah (2011); and Kim et.al (2006). Most of the studies on South Asia's tourism relationship and growth are descriptive, which include Rasul and Manandhar (2009) and Nawaz and Hassan (2016). This is due to the fact that most of the data series on international tourism in the Indian subcontinent are of recent origin since tourism emerged as a source of external support for economic growth only from the late 1990s.

Role of ICT

Studies on ICT and growth began in the 1990s focusing on developed countries, such as the US and European countries. Vast majority of the studies showed positive association of between ICT and economic growth. Leading studies are Jorgenson et al. (2000), Inklaar et al., (2005), who compared the role of ICT in Europe and the US between 1979-2000 and showed the contribution of ICT to economic growth was greater in the US than in Europe; and Roller and Waverman (2001) in their study on OECD-21 countries concluded that improvements in the telecommunication sector have proved to be crucial for economic growth.

Specific country case studies emphasizing the beneficial effect of ICT in boosting long term growth and development are Jalava and Pohjola (2008) for Finland; Kumar (2011) for Nepal; Jorgenson and Motohashi (2005) for Japan; and Kasahar and Rodrique (2008) for Indonesia. Kumar et al. (2016) for China. All of them established that developing countries can leapfrog and achieve higher growth rates. Table 1 provides a summary of notable studies on tourism and economic growth.

TABLE 1. TOURISM- GROWTH LITERATURE REVIEW SUMMARY

Author	Period	Country	Frequency	Variables	Methodology	Causality	Effect
Balaguer and Cantavella-Jorda (2002)	1975-1998	Spain	Quarterly	Tourist earnings, exchange rate	VECM	T→GDP	+
Durbarry (2004)	1952-1999	Mauritius	Annual	Tourism earnings, capital stock, human capital, labor	VECM	T↔GDP	+
Cortez-Jimenez and Paulina (2006)	1954-2000	Italy	Annual	Tourist earnings, capital stock, human capital	VECM	T↔GDP	+
Kim et al. (2006)	1971-2003	Taiwan	Quarterly and Annual	Tourist earnings	VECM	T↔GDP	+
Lee and Chang (2008)	1990-2002	Panel OECD	Annual	Tourist earnings	Panel	T→GDP	+

Narayan et al. (2010)	1988-2004	Panel: PICs	Annual	Tourist earnings	Panel FMOLS	T→GDP	+
Seetanah (2011)	1990-2007	Panel Caribbean and Islands (19)	Annual	Tourist earnings	GMM	T↔GDP	+
Tang and Tan (2015)	1975-2011	Malaysia	Annual	Tourist earnings, political stability	VECM	T→GDP	+
Stauvermann et al. (2018)	1980-2014	Sri-Lanka	Annual	Tourist earnings, capital stock, exchange rate, labor	ARDL	T→GDP	+

Notes: GDP: Gross Domestic Product. ARDL: Autoregressive Distributed Lag approach. NA: not applicable. T→GDP - causality relationship from tourism to GDP. T↔GDP - the bidirectional relationship amid tourism and GDP. PICs - Pacific Island Countries. + is a positive effect of tourism on GDP.

3. Trends in tourism growth in south Asian countries

Reforms by the South Asian nations which were introduced in the mid 1990 for opening up their economies resulted in gradual shift away from fixed exchange rate regimes towards eventual adoption of flexible rates and relaxation of exchange controls together with mobility of capital and labour. They contributed towards liberalization of the economies which encouraged FDI inflows as well in manufacturing and services sectors, including hotels and resorts and airline industries and services. International tourism began to make a mark. Increasingly liberalized air transport market, emergence of low-cost carriers offering inexpensive flights and relaxation of visa requirements eased travel to South Asia. (Asian Development Bank, 2020). Table 2 presents data on international tourist arrivals in numbers and tourism earnings as percent of GDP for each of the six SAARC countries.

TABLE 2. SOUTH ASIAN COUNTRIES: INTERNATIONAL TOURIST ARRIVALS AND INTERNATIONAL TOURISM EARNINGS: 2000-2018

Bangladesh	**2000**	**2005**	**2010**	**2015**	**2016**	**2017**	**2018**
Intl Tourism Arrivals(number mill)	199	208	303	643	830	1026	NA
Intl Tourism Earnings (US $ mill)	50	82	103	150.3	214.3	348	357
Intl Tourism Earnings (% of GDP)	0.07	0.10	0.09	0.10	0.13	0.19	0.18
Bhutan							
Intl Tourist Arrivals (number mill)	7.6	13.6	41	155	210	255	274
Intl Tourism Earnings(US $ mill)	10	19	64	120	139	153	121
Intl Tourism Earnings (% of GDP)	1.51	1.95	4.13	5.99	6.44	6.24	5.13
India							
Intl Tourist Arrivals (number mill)	2649	3919	5776	13284	14570	15543	17423
Intl Tourism Earnings (US $ Mill)	3598	7659	14490	21472	23111	27878	29143

Intl Tourism Earnings (% of GDP)	0.77	0.93	1.01	1.09	1.09	1.21	1.17
Nepal							
Intl Tourist Arrivals (number mill)	464	375	603	539	753	940	1173
Intl Tourism Earnings (US $ mill)	219	160	378	509	498	712	7444
Intl Tourism Earnings (% of GDP)	3.99	1.97	2.36	2.38	2.35	2.83	3.24
Pakistan							
Intl Tourist Arrivals (number mill)	557	798	907	NA	NA	NA	NA
Intl Tourism Earnings (US $ mill)	551	828	998	915	791	866	818
Intl Tourism Earnings (% of GDP)	0.47	0.55	0.56	0.42	0.35	0.36	0.32
Sri Lanka							
Intl Tourist Arrivals (number mill)	400	549	654	1798	2051	2116.4	2334
Intl Tourism Earnings (US $ mill)	388	729	1044	3978	4591	5083	5608
Intl Tourism Earnings (% of GDP)	1.13	1.75	1.84	5.20	5.74	6.14	6.55

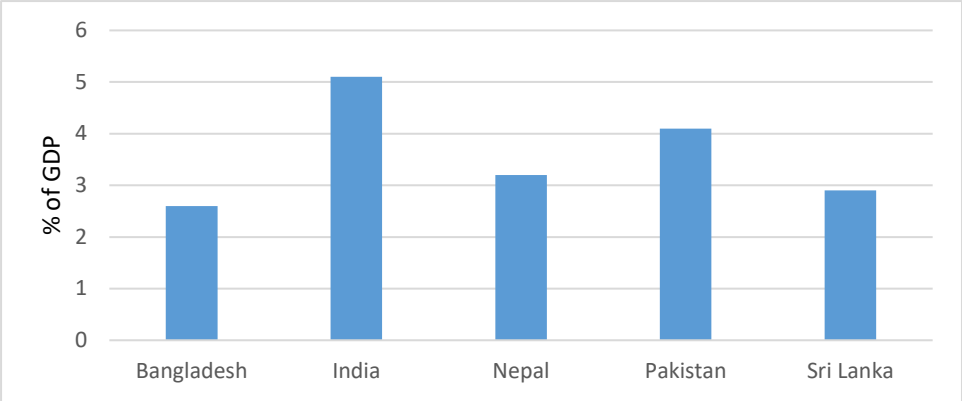
Source: WDI (2020) and author's calculations

Annual international tourism earnings also added to foreign exchange reserves of each country, thus providing a sizeable cushion to reduce pressures on current accounts in the balance of payments. Since exports of SARRC countries were growing slowly or remaining stagnant, rise in tourism earnings have been a major support, especially when South Asian countries found themselves unable to withstand competition from China in regard to manufactured consumer goods. Further, rise in foreign exchange reserves enabled SAARC countries raising their credit worthiness to borrow more from international as well as private lending agencies.

Regional tourism and domestic tourism

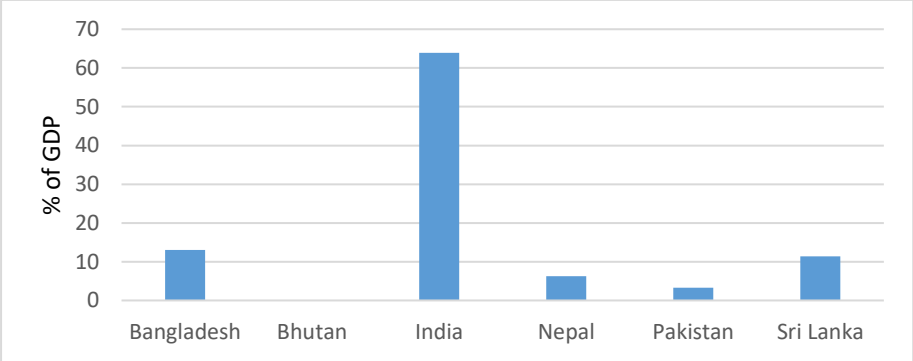
Intra-regional tourism by destination is dominated by India. Nearly 20 percent are from within the region and about 63.94 percent of them were received by India followed by Bangladesh and Sri Lanka (World Bank 2020). Domestic tourism figures are best reported by expenditures as percent of GDP. Indians spend 5.03 percent of GDP on travel within the country, which is mostly for visiting relatives and friends and religious tours, and for educational tours and travel during the hot summer to hill stations and cooler places. In domestic travel, next to India were Pakistan and Nepal (Figure 1)

Figure 1. SAARC: Expenditure of Domestic tourism as percent of GDP in 2019.



Source: World Travel and Tourism Council.

Figure 2. Intra-regional trips in 2018 (% of total international arrivals arrival into destination countries)



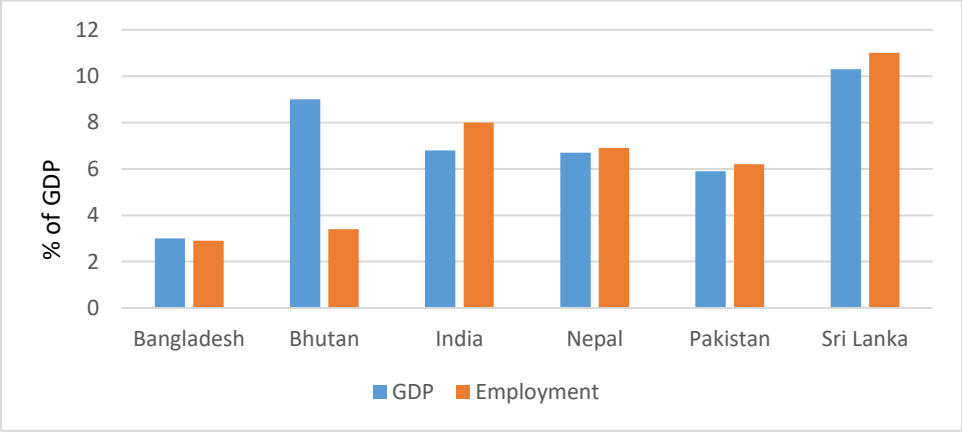
Source: World Travel and Tourism Council (2019).

Tourism and jobs

The WTC report (2020) reviewing the impact of Covid-19 reflects on how growth in tourism industry has been creating jobs over the last two decades. It is estimated one out of every 10 jobs in the economy is in tourism sector as a whole and there were about 296 million jobs in 2019 (WITC 2020). South Asia is highly dependent on travel and tourism, especially as a generator of jobs, which is estimated to be about 47.7 million in 2019 (World Bank, 2020). Since exports of some SARRC countries were growing slowly or nearly stagnant, tourism earnings proved a major support, especially when South Asian countries found themselves unable to withstand competition from China in regard to consumer goods. The sub-sectors of tourism industry include hotels and resorts, airlines and cruise lines, domestic transport services, including railways and surface transport to assist tourists in their travels to various points of interest within the host countries such as national parks and historical sites and eating places of ethnic interest and conventional restaurants, and tour operations and online travel agencies. Almost all of them use ICT sector services. It is of interest that most of the enterprises catering to the various needs of tourists happen to be mini and micro enterprises, which are in informal tourism sector dominating the tourism sector to the extent of 85 percent. The supply chain extends to link livelihoods in agriculture, fisheries, handicrafts and creative industries, which include preparation of ethnic meals for tourists, music, dance and other entertainment services.

Most of the jobs in tourism industry, as the Global Report on Women and Tourism (2020) notes, are handled by women. It is estimated that about 53 percent of the front line positions and housekeeping jobs are held by female workers. In the informal sector, selling handicrafts and clothing and serving ethnic food are nearly 80 percent women sellers and most of them being part time employees (WITC, 2020). Among the six SAARC member countries, the shares of tourism in GDP and total employment are in the range of 2 % (Bangladesh) to 11% (Sri Lanka).

Figure 3. Share of Tourism in GDP and in Total Employment (%) in 2019.



Source: World Travel and Tourism Council and UN World Travel Organisation.

Tourism and ICT

The spread of ICT in developed countries since the 1980s was followed by the adoption of ICT and usage of mobile phones in a big way by urban and rural population and those in remote and far flung areas in developing countries have brought about an unprecedented economic transformation, now called "the Fourth Industrial revolution" (Schwab, 2015). As the *2016 World Development Report* (World Bank, 2016) notes that the Fourth Industrial Revolution is still ongoing, "where all economic agents, either as producer, retailer and consumer, or units, institutions and individuals move between digital domains and offline reality with the use of connected technology to enable and manage their lives".

Aside from enhancing labour productivity through upgrading skills, ICT now plays a critical role in all sectors of the economy such as manufacturing, trading, distribution, transportation, education and new sectors like e-commerce by reducing transaction costs (Xing, 2018). Further, technology has also become a cornerstone for the banking and financial systems, as it has enabled greater financial inclusion through reaching the unbanked segments of the population through mobile banking and new financial products (Jayaraman and Makun, 2019). More than 40 per cent of the world's population has been improving access to the internet with new users coming online every day; among the poorest 20 per cent of households, nearly 7 out of 10 have a mobile phone; and "the poorest households are more likely to have access to mobile phones than to toilets or clean water!" (World Bank 2016). The Geneva based international Telecommunication Union has evolved an ICT index based on 11 indicators and has been

monitoring progress of ICT adoption progress in developed and developing countries[4]. Table 3 presents a comparative picture of ICT based on ICT index for SAARC countries.

TABLE 3. ICT INDICATORS FOR SAARC: 2019

Countries	ICT Index
Bangladesh	2.53
Bhutan	3.69
India	3.03
Nepal	2.88
Pakistan	2.42
Sri Lanka	3.91

Source: International Telecommunication Union website.

All economic activities are now touched by internet and mobile phone connectivity. Tourism is no exception. Increasing usage of internet by international travelers for online booking of travel by air or cruise ships and for accommodation of all kinds, ranging from luxury resorts and hotel to home stays and guest houses providing cheaper accommodation for the youth and backpackers seeking adventure through ecotourism and travel in the interior and rural parts of host countries, have been made easier and faster. Table 4 presents trends in usage of ICT in the six countries under study. During the 18 year period the growth in use of cellular phones, popularly known as mobile phones has been phenomenal. The usage of internet is, however, mainly confined to urban towns, which have greater access to uninterrupted supply of electricity compared to rural areas and remote parts of each of the six countries under study.

TABLE 4. USAGE OF INTERNET AND MOBILE PHONES: 2015- 2018

Bangladesh	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Individuals using Internet (% of population)	3.70	4.50	5.00	6.63	13.90	14.40	18.02	15.00	15.00
Secure internet servers	30.00	73.00	111.00	146.00	202.00	314.00	3731.00	10413.00	18712.00
Secure internet servers (per million)	0.20	0.49	0.74	0.96	1.31	2.01	23.62	65.22	115.97
Mobile cellular subscription (per 100)	46.03	56.52	64.36	76.30	82.10	84.08	86.08	94.53	97.28
Mobile cellular subscriptions (in millions)	67.92	84.37	97.18	116.55	126.87	131.38	135.98	150.95	156.99
Bhutan									
Individuals using Internet (% of population)	13.60	14.40	15.60	22.40	30.30	39.80	41.77	48.11	48.11
Secure internet servers	1.00	2.00	8.00	7.00	13.00	14.00	27.00	88.00	134.00
Secure internet servers (per million)	1.46	2.88	11.40	9.86	18.08	19.23	36.65	118.03	177.63
Mobile cellular subscription (per	57.52	69.84	79.95	76.64	86.86	92.84	94.80	98.00	93.26

[4] A composite index that combines 11 indicators into one benchmark measure. The main objectives are: (i) the level and evolution over time of ICT developments within countries and the experience of those countries relative to others; (ii) progress in ICT development in both developed and developing countries; (iii) the digital divide, i.e. differences between countries in terms of their levels of ICT development; and (iv) the development potential of ICTs and the extent to which countries can make use.

100)									
Mobile cellular subscriptions (in millions)	0.39	0.48	0.56	0.54	0.62	0.68	0.70	0.73	0.70
India									
Individuals using Internet (% of population)	7.50	10.07	12.58	15.10	21.00	17.00	22.00	34.45	34.45
Secure internet servers	2061	2842	5704	7880	10941	15313	50723	164791	254032
Secure internet servers (per million)	1.67	2.27	4.51	6.15	8.44	11.69	38.30	123.10	187.81
Mobile cellular subscription (per 100)	60.94	71.49	68.32	69.20	72.86	76.41	85.15	87.32	86.94
Mobile cellular subscriptions (in millions)	752	893.86	864.72	886.30	944.01	1001.06	1127.81	1168.90	1176.02
Nepal									
Individuals using Internet (% of population)	7.93	9.00	11.15	13.30	15.44	17.58	19.69	34.00	34.00
Secure internet servers	24.00	35.00	63.00	79.00	99.00	147.00	508.00	4372.00	5126.00
Secure internet servers (per million)	0.89	1.29	2.33	2.93	3.68	5.44	18.63	158.25	182.50
Mobile cellular subscription (per 100)	34.04	49.39	61.54	79.36	85.56	101.86	117.82	130.63	139.45
Mobile cellular subscriptions (in millions)	9.20	13.35	16.61	21.36	23.02	27.52	32.12	36.10	39.18
Pakistan									
Individuals using Internet (% of population)	8.00	9.00	9.96	10.90	12.00	14.00	12.39	15.51	15.51
Secure internet servers	106.0	146.0	240.0	328.0	479.00	680.00	6448.0	23923.0	23161.0
Secure internet servers (per million)	0.59	0.80	1.28	1.71	2.45	3.41	31.67	115.07	109.14
Mobile cellular subscription (per 100)	55.28	59.39	64.16	66.79	69.51	63.13	67.03	69.51	72.56
Mobile cellular subscriptions (in millions)	99.19	108.9	120.1	127.7	135.7	125.9	136.5.	144.5	154.0
Sri Lanka									
Individuals using Internet (% of population)	12.00	15.00	18.29	21.90	25.80	12.10	16.40	34.11	34.11
Secure internet servers	72.00	106.0	189.0	238.0	331.0	439.0	1507.0	6545.0	8937.0
Secure internet servers (per million)	3.55	5.20	9.25	11.56	15.93	20.93	71.07	305.21	412.41
Mobile cellular subscription (per 100)	85.68	89.81	94.16	98.32	106.42	114.31	122.72	133.47	115.06
Mobile cellular subscriptions (in millions)	17.36	18.32	19.33	20.32	22.12	23.90	25.80	28.20	24.43

Source: WDI (2020)

4. Theoretical framework and methodology

Framework

To explore the tourism-economic growth nexus, we employ use the neoclassical economic growth model of Solow (1956). The output per capita is formulated as:

$$y_t = A_t k_t^{\alpha}, \qquad 0 < \alpha < 1 \tag{1}$$

where

y = GDP per capita in constant US dollars;

A = stock of technology;

k = stock of capital per capita in constant US dollars;

α = share of capital;

t = time

The model is postulated as follows:

$$A_t = A_o e^{gt} \tag{2}$$

where,

A_o = initial stock of technical technology;

g = technology growth over time trend t.

Given the objective, the present study includes tourism and ICT in the growth equation, which takes the production functional approach. We also test their interaction term to determine whether tourism and ICT are complementary to each other or behave as substitutes. The effects of the two shift variables namely, tourism and ICT on A_t which is called total factor productivity) are realized as shift variables. Hence, we formulate the functional relationship as below:

$$A_t = f(TOUR_t, ICT_t, TOIC) \tag{3}$$

where ,

$TOUR$ = tourism earnings as percent of GDP;

ICT = number of mobile subscriptions per 100 inhabitants; and

$TOIC$ = interaction term, which is the product of tourism and ICT.

Hence, the Cobb-Douglas production function is further modified as:

$$y_t = (A_o e^{gt} TOUR_t^{\beta_1}, ICT_t^{\beta_2}, TOIC^{\beta_3}) k_t^{\alpha_1} \tag{4}$$

Taking logs (l) and reorganizing Equation (4) leads us to tourism-growth Equation (5):

$$ly_t = \alpha_0 + \alpha_1 lk_t + \beta_1 lTOUR_t + \beta_2 lICT_t + \beta_3 lTOIC_t + \varepsilon_t \tag{5}$$

The rationale for taking logs is to statistically adjust the variables for observing and determining the magnitudes of the change in the variables. It also enables us to interpret the coefficients of the variables in terms of elasticity. Theoretically, it is hypothesized that capital stock, tourism and ICT are directly associated with economic growth. The sign of the interaction term, TOIC is however ambiguous. A statistically significant and positive coefficient of the interaction term would imply a complementary relationship while a negative sign of the coefficient would mean tourism and ICT are substitutes.

Data

The study covers the period from 1995 to 2017. The term *y* stands for GDP per capita in constant US$, as dependent variable, a change in which denotes economic growth. Tourism earnings as percent GDP is used as proxy for tourism, while mobile subscriptions per 100 inhabitants is used to represent ICT variable. The data sets for these variables are obtained from *World Development Indicators* (WDI) published by World Bank. The capital stock per capita (in constant US$) is obtained from *Penn World Tables.* Table 5 reports the basic descriptive summary of these variables. The mean statistics show the average tourism earnings in six subcontinent countries is about 2 percent. The mobile subscription on an average is 37 per hundred inhabitants. Tourism earnings is positively linked to GDP per capita at about 0.52 while ICT and capital stock are at 0.58 and 0.93 with GDP per capita, respectively.

TABLE 5. DESCRIPTIVE SUMMARY

	Y	*k*	*TOUR*	*ICT*	*TOIC*
Mean	1307.640	14916.620	1.800	37.436	0.654
Median	990.362	8547.303	1.005	21.757	0.623
Maximum	3860.150	53342.590	6.605	133.468	3.095
Minimum	436.560	3262.186	0.066	0.002	-1.334
Std. Dev.	837.524	11819.990	1.682	38.682	1.014
Observations	126	126	126	126	126
	Y	*k*	*TOUR*	*ICT*	*TOIC*
y	1.000				
k	0.927	1.000			
TOUR	0.518	0.662	1.000		
ICT	0.583	0.521	0.162	1.000	
TOIC	0.183	0.010	-0.145	0.697	1.000

Model and methodology

We employ the NARDL model developed by Shin et al. (2014) to explore the asymmetric effects of tourism on the real per capita GDP in six countries under study. The NARDL model represents asymmetric extension of Pesaran et al. (2001) linear ARDL model. We begin by presenting the linear panel ARDL model first. According to Pesaran et al. (2001), the following unrestricted error correction model is written as:

$$\Delta ly_{it} = \alpha_0 + \alpha_1 ly_{it-1} + \alpha_{2i} lk_{t-1} + \alpha_{3i} lTOUR_{t-1} + \alpha_{4i} lICT_{t-1} + \alpha_{5i} lTOIC + \sum_{i=1}^{n} \beta_{1i} \Delta ly_{it-i}$$
$$+ \sum_{i=0}^{n} \beta_{2i} \Delta lk_{it-i} + \sum_{i=0}^{n} \beta_{3i} \Delta lTOUR_{it-i} + \sum_{i=0}^{n} \beta_{4i} \Delta lICT_{it-i} + \sum_{i=0}^{n} \beta_{5i} \Delta lTOIC_{it-i} + \mu_i + \varepsilon_{it} \quad (6)$$

Here α_0 is the constant, μ_i is the group-specific effect, ε_t is the error term, $\alpha_{1,2..5}$ represent long-run parameters, and $\beta_{1...5}$ is short-run parameters. n indicates optimal lags of variables in

difference form which is selected by SIC. Equation (6) can be further re-specified as error correction model as:

$$\Delta ly_{it} = \delta\tau_{it-1} + \sum_{i=1}^{n}\beta_{1i}\Delta ly_{t-i} + \sum_{i=0}^{n}\beta_{2i}\Delta lk_{t-i} + \sum_{i=0}^{n}\beta_{3i}\Delta lTOUR_{it-i}\sum_{i=0}^{n}\beta_{4i}\Delta lICT_{it-i} + \sum_{i=0}^{n}\beta_{5i}\Delta lTOIC_{it-i} + \mu_i + \varepsilon_t \quad (7)$$

Where $\delta\tau_{it-1}$ is the error correction term and δ is the adjustment parameter. Δ is the difference form indicating short-run dynamics.

To analyze for the nonlinear panel ARDL, which allows for the asymmetric effect of tourism to real per capita GDP, we consider Equation (6) following Shin et al. (2014). Employing this methodology, positive and negative shocks of tourism are examined. The positive and negative shocks are expected to have differential effect on GDP. The asymmetric version of Equation (6) is presented below:

$$\Delta ly_t = \alpha_{0i} + \alpha_{1i}ly_{t-1} + \alpha_{2i}lk_{t-1} + \alpha_{3i}lICT_{t-1} + \alpha_{4i}^{+}lTOUR_t^{+} + \alpha_{4i}^{-}lTOUR_t^{-} + \alpha_{5i}lTOIC_{t-1} + \sum_{i=1}^{n}\beta_{1i}\Delta ly_{t-i} + \sum_{i=0}^{n}\beta_{2i}\Delta lk_{t-i} + \sum_{i=0}^{n}\beta_{3i}\Delta lICT_{t-i} + \sum_{i=0}^{n}\beta_{4i}{}^{+}\Delta lTOUR_{t-i}^{+} + \sum_{i=0}^{n}\beta_{4i}{}^{-}\Delta lTOUR_{t-i}^{-} + \sum_{i=0}^{n}\beta_{5i}\Delta lTOIC_{t-i} + \mu_i + \varepsilon_t \quad (8)$$

Where $lTOUR_t^{+}$ and $lTOUR_t^{-}$ are the positive and negative partial sum derivation computed as:

$$lTOUR_t^{+} = \sum_{t=1}^{n}\Delta lTOUR_t^{+} = \sum_{t=1}^{n}\max(\Delta lTOUR_{t,}0)$$

$$lTOUR_t^{-} = \sum_{t=1}^{n}\Delta lTOUR_t^{-} = \sum_{t=1}^{n}\min(\Delta lTOUR_{t,}0).$$

Where $lTOUR_t = lTOUR_0 + lTOUR_t^{+} + lTOUR_t^{-}$. The elasticity coefficient of $lTOUR_t^{+}$ and $lTOUR_t^{-}$ is computed as: $\eta^{+} = -\frac{\alpha_{4i}^{+}}{\alpha_{1i}}$ and $\eta^{-} = -\frac{\alpha_{4i}^{-}}{\alpha_{1i}}$.

The error correction representation of Equation (8) yields the following:

$$\Delta ly_t = \rho\varsigma_{it-1} + \sum_{i=1}^{n}\beta_{1i}\Delta ly_{t-i} + \sum_{i=0}^{n}\beta_{2i}\Delta lk_{t-i} + \sum_{i=0}^{n}\beta_{3i}\Delta lICT_{t-i} + \sum_{i=0}^{n}\beta_{4i}{}^{+}\Delta lTOUR_{t-i}^{+} + \sum_{i=0}^{n}\beta_{4i}{}^{-}\Delta lTOUR_{t-i}^{-} + \sum_{i=0}^{n}\beta_{5i}\Delta lTOIC_{t-i} + \mu_i + \varepsilon_t \quad (9)$$

The error correction term ($\rho\varsigma_{it-1}$) estimates the equilibrium asymmetric relationship in the specified model and the associated parameter (ρ) captures the adjustment rate. The short-run positive and negative changes in tourism earnings are captured by β_{4i}^{+} and β_{4i}^{-} respectively. To test for the long run and short run symmetry, the standard Wald test is applied. The null

hypothesis ($H_{null}:\eta^{+}=\eta^{-}$) for long run symmetry is tested against the alternative hypothesis ($H_{alt}:\eta^{+}\neq\eta^{-}$). Similarly, the short-run symmetry of tourism is tested by evaluating the null hypothesis ($\sum_{i=0}^{n}\beta_{4i}{}^{+}=\sum_{i=0}^{n}\beta_{4i}{}^{-}$).

5. Results and discussion

A pre-condition of ARDL procedure is that variables should not be integrated order of more than one. Ouattara (2004) advises the result could be invalid if the series are of I(2). Thus, it is important to determine integration of the variables. To do this we applied panel unit root tests. The heterogenous panel data model is commonly used where non-stationary is an issue. We used two different types of panel unit root tests. The first type of panel unit root test involves the null hypothesis of unit root with a common process (Levin, Lin and Chu, 2002). The second type assumes unit root with individual unit root process (Im, Pesaran and Shin, 2003; Maddala and Wu, 1999 -Fisher-ADF; Maddala and Wu, 1999 -Fisher-PP). All the series have unit root in level form, except for the ICT variable, which is I(0) and the interaction term (*lTOIC*), which is I(0) under LLC test. However, in the first difference form, all the variables are integrated of one [I(I)]. Given the mixed integration order of the variables, our estimation framework that takes into consideration heterogeneity and unit root concerns in the panel data setting is valid. Essentially, the unit root test further confirms the appropriate choice of panel ARDL model in this paper.

TABLE 6. PANEL UNIT ROOT TEST RESULTS

Variables	Test statistics (probability values)				
Panel A: In Level	LLC	IPS	MW(ADF)	MW(PP)	Conclusion
Ly	3.784 (0.999)	6.381 (0.100)	0.2755 (0.100)	2.101 (0.999)	-
Lk	0.270 (0.606)	3.247 (0.999)	2.392 (0.998)	7.522 (0.821)	-
lTOUR	-0.208 (0.417)	-0.125 (0.449)	-15.360 (0.222)	12.121 (0.436)	-
lICT	-5.503 (0.000)*	-5.823 (0.000)*	50.989 (0.000)*	64.027 (0.000)*	I (0)
lTOIC	-3.845 (0.000)*	-0.175 (0.430)	14.025 (0.299)	15.627 (0.208)	
Panel B: In First Difference					
Ly	1.467 (0.071)***	3.405 (0.000)*	33.545 (0.000)*	63.047 (0.000)*	I (1)
Lk	2.110 (0.017)**	1.874 (0.030)**	20.514 (0.058)***	24.992 (0.014) **	I (1)
lTOUR	-7.329 (0.000)*	-6.811 (0.000)*	64.904 (0.000)*	85.399 (0.000)*	I(1)
lICT	-2.213 (0.081)***	-1.553 (0.060)**	19.555 (0.076)***	33.586 (0.000)*	I (1)
lTOIC	6.968 (0.000)*	-3.658 (0.000)*	73.859 (0.000)*	38.922 (0.000)*	I(1)

Note: LLC and IPS indicate Levin et al. (2002) and Im et al. (2003) panel unit root tests. MW (ADF) and MW (PP) represent Maddala and Wu (1999) Fisher-ADF and Fisher-PP panel unit root tests, respectively. The LLC, IPS, MW (ADF), and MW (PP) all inspect the null hypothesis of a unit root. The values in brackets are the probabilities.*, ** and *** indicate significance level at 1%, 5% and 10% level respectively.

Estimation of the two models

We now proceed to estimate linear and nonlinear models for tourism and economic growth relationship[5]. We use both, the Pooled Mean Group (PMG) estimator and the Mean Group (MG)

[5] See linear model estimate in Appendix.

estimator (Pesaran et al, 1999). PMG and MG estimators are subjected to Hausman test to determine the better estimator of the two (Salisu and Isah, 2017)[6]. The result of the Hausman test is reported in the respective tables. Our results indicate the null hypothesis cannot be rejected and that the PMG estimator is the efficient estimator for modeling tourism-growth nexus. Therefore, the result of only PMG estimator is reported and discussed in this paper. According to Bahmani-Oskooee and Bohl (2000) long run relation between variables depend on lag order. On the other hand, taking too many or too few lags can vitiate the model in capturing essential information (Stock and Watson, 2012). Considering this essential feature, we used one lag following SBC criteria as optimal lag order.

Nonlinear ARDL Model

Table 8 provides the results of the nonlinear ARDL estimation. Prior to application of asymmetric model, we test the presence of long run and short run asymmetries. Table 7 shows the results of the Wald test for symmetry. The estimated probability values of F-statistics are significant at a one percent, which rejects the null hypothesis of long and short-run symmetry. Thus, it is confirmed from the panel study of six SAARC countries there is an asymmetric relation between tourism and economic growth.

TABLE 7 ASYMMETRIC EFFECT WALD TEST

Null hypothesis	Long run	Short-run
Tourism have symmetric effect on real per capita GDP	$X^2(1)=7.030$ (0.000)*	$X^2(1)=2.651$ (0.009)*

*Note: * represent statistical significance at 1% level.*

In estimation (Table 8), the long-run asymmetric parameters ($lTOUR_t^+$ and $lTOUR_t^-$) capture the asymmetric effect of tourism earnings on economic growth. The coefficients 0.055 and 0.096 are associated with positive ($lTOUR_t^+$) and negative ($lTOUR_t^-$) partial sum decompositions, respectively. The positive shock of tourism, say a 1 percent increase in tourism leads to 0.055 percent increase in economic growth while a negative shock indicates a 1 percent decrease in tourism results in a 0.096 percent decline in economic growth. The impact of negative ($lTOUR_t^-$) partial sum decomposition on economic growth is much greater in magnitude than that of positive ($lTOUR_t^+$) partial sum decomposition of tourism in these economies. The decline in tourism is likely to have more detrimental than a similar sized increase in tourism.

The effect of other conditioning variables, which are capital stock, ICT, and interaction term have expected positive signs and are also statistically significant in the long run. The effect of interaction term (TOIC) is positive and statistically significant in the long run. These findings imply that tourism and ICT are complementary in boosting economic growth in South Asian countries. Such effects of tourism and ICT were not explored earlier for South Asian nations.

[6]The extensively used methodologies in panel ARDL estimation procedure are the MG estimator-relies on estimating *N* time-series regression and takes the average coefficient (Blackburne and Frank, 2007), whereas the PMG estimator takes the combination of pooling and averaging of coefficients. Nevertheless, to obtain the preferred estimator between the two, the Hausman test is applied. The null hypothesis is that the PGM is an efficient estimator while the alternative hypothesis is that the MG is an efficient estimator. In addition to panel regression analysis, the PMG and MG estimators also estimate the short-run coefficient of individual units.

The advent of ICT, particularly the mobile phone usage has a substantial effect on how communication and businesses is carried out in the economy including the tourism industry (Bethapudi, 2013). The usage of mobile phones has substantially increased in Indian sub-continent countries, enhancing access to information and services, consequently contributing to economic growth. The additional gains in productivity enhanced by ICT lowers the cost and boost the process of economic activities.

TABLE 8 NON-LINEAR PANEL ARDL ESTIMATION

Variables	Coefficient	Standard error	P-value
lk	0.689	0.120	0.000*
$lTOUR_t^+$	0.055	0.026	0.042**
$lTOUR_t^-$	0.096	0.029	0.001*
$lICT$	0.075	0.004	0.000*
$lTOIC$	0.008	0.004	0.058***
Δlk	0.549	0.022	0.000*
$\Delta lTOUR_t^+$	0.036	0.082	0.662
$\Delta lTOUR_t^-$	0.101	0.015	0.000*
$\Delta lICT$	0.024	0.008	0.005*
$\Delta TOIC$	0.004	0.012	0.720
Constant	0.182	0.127	0.158
$\hat{\tau}_{t-1}$	-0.352	0.011	0.000*
Hausman test	1.213		
	(0.274)		
Log-likelihood	270.970		
No. of Obsv	139		
Error correction terms for each country			
Bangladesh	-0.085	0.001	0.000*
Bhutan	-0.212	0.011	0.000*
India	-0.245	0.002	0.000*
Nepal	-0.132	0.002	0.000*
Pakistan	-0.391	0.018	0.000*
Sri Lanka	-0.702	0.114	0.008**

Note: *, ** and *** indicate statistical significance at 1%, 5% and 10% respectively. "+" and "-" denote positive and negative partial sums respectively. The probability value for the Hausman test is in the brackets.

In the short run, the results show that a positive shock ($lTOUR_t^+$) in tourism earnings has a positive effect on growth, however it is not statistically significant. The negative shock ($lTOUR_t^-$) in tourism earnings is positive and significant at one percent level. Nonetheless, like in the long run, the negative shock in tourism has greater impact on growth in short run. The error correction term (ECT) coefficients for the nonlinear panel is negative and statistically significant ($\hat{\tau}_{t-1}$ =-0.352). Any shock to the nonlinear tourism-growth relationship will be adjusted by about 35 percent, and the system converging to the long run in about 3 years. Besides this PMG estimator also gives the individual country groups error correction model. In Table XX, the error

correction coefficient of each country is shown. From these ordered error correction estimates, all the countries have a negative and statistically significant error correction coefficient, confirming that there is a long-run cointegration relationship.

6. Conclusion and policy implications

This paper investigated the role of tourism supported by ICT in economic growth of the six South Asian countries. A nonlinear ARDL estimation model results confirm the presence of an asymmetric relationship between tourism earnings and economic growth. Although a positive shock in tourism earnings has a beneficial effect on long run growth, the negative shock in tourism earnings leads to substantial reduction in growth both in the long and short run. The results of the study are relevant in the context of the current Covid-19 pandemic which has drastically reduced number of tourist arrivals in the region.

Although progress of vaccination of the populations against the pandemic with two minimum doses after the required intervals between the first and second doses has picked up fast, it looks full coverage is not certain until the mid-2022. Full consumer trust of the same level as of pre-Covid days cannot be restored and assured, as the fear of international tourists especially from advanced countries is likely to persist for some more time and well into 2023.

Encouraging intraregional tourism within SAARC offers enormous scope in the short-run, since international travel from outside the region would take some time more to resume as confidence level has to be restored to match that of pre-Covid-19 pandemic years. Success of intraregional travel promotion would depend on efforts that would include air travel bubble agreements between countries within the SARRC region, which can be bilaterally and multilaterally negotiated. In the recovery phase, SAARC countries may consider special efforts such as waiving visa requirements, attractive discounts in travel fare as accommodation charges to attract travelers from within SAAR region. Restoration of confidence to travel can be fostered by improved sanitary and hygienic conditions and strict enforcement of Covid-19 protocols, all of which are given wide publicity.

No doubt, the downsides of the pandemic include loss of lives and livelihoods, there are positive and encouraging upsides, which would give confidence to policymakers towards strengthening efforts for economic diversification and reducing dependency on tourism alone. As the World Bank (2021b) has characterized ICT's role in tourism, the pandemic has brought to light the hidden potential during the lockdowns in several spheres, including payment systems, telehealth, online hygiene education, and many other digital applications. Given the higher degree of broadband and mobile internet penetration in each country in the region, there is great scope for improvements in many areas of economic development, especially in small and medium enterprises, manufacturing consumer goods and their supplies for domestic consumption, delivering health and education services promoting more balanced development within each member country of the SAARC region. More importantly, other sectors such as fisheries and marine products development which have export potential and similar efforts towards land intensive exportable in landlocked countries such as Bhutan and Nepal can now be taken up more seriously in collaboration with regional and international commercial interests.

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Appendix

Linear model

The results show that tourism (*lTOUR*) has positive effect on economic growth, consistent with the findings of Lee and Chang (2008). Specifically, the long run estimate of tourism with respect to growth of six Indian sub-continent countries is 0.21. In other words, the result indicates that a one percent increase in tourism earnings will increase economic growth by 0.21 percent. It is found that the size of tourism earning's effect on growth is higher in long run than that in short run, suggesting the importance tourism in long run for enhancing economic growth through

enhanced investment in tourism industry as well as helping countries by accumulating much need foreign reserves.

There are several studies which suggest positive effect of tourism on growth. Tourism help economy through various conduit; it creates jobs, revenues for governments, and income, which consequently contributes to the economy (Lim, 1997; Oh, 2005). The contribution of ICT is found to be positively associated with economic growth, both in the long run and short run. The elasticity coefficient of ICT with respect to growth is 0.041 percent, consistent with studies such as Kumar et al. (2015) and Niebel (2018). Moreover, the interaction term (*lTOIC*) is found to be positive and statistically significant – implying that tourism and ICT acts as complementary to promote economic growth.

Table 1. Linear panel ARDL estimation

Variables	Coefficient	Standard error	P-value
lk	0.469	0.099	0.000*
lTOUR	0.210	0.034	0.000*
lICT	0.041	0.004	0.000*
lTOIC	0.017	0.005	0.004*
Δlk	0.377	0.372	0.313
$\Delta lTOUR$	0.028	0.017	0.098***
$\Delta lICT$	0.0378	0.012	0.003*
$\Delta TOIC$	0.099	0.022	0.000*
Constant	1.269	0.157	0.000*
$\hat{\tau}_{t-1}$	-0.449	0.250	0.077***
Hausman test	0.109 (0.741)		
Log-likelihood	281.827		
No. of Obsv	139		
Error correction terms for each country			
Bangladesh	-0.041	0.002	0.000*
Bhutan	-0.296	0.030	0.002*
India	-0.608	0.045	0.000*
Nepal	-0.054	0.005	0.002*
Pakistan	-0.443	0.022	0.000*
Sri Lanka	-0.902	0.001	0.000*

Note: *, ** and *** indicate statistical significance at 1%, 5% and 10% respectively. The probability value for the Hausman test is in the brackets.