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Tourism and Economic Growth: A Comparative Study for Two Emerging Countries

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Abstract

This paper aims at investigating the interrelation between economic and tourism growth, by making use of a system equation model for two most emerging countries China and Mexico covering the time period from 1995 to 2017. Seemingly unrelated regression estimation (SURE) method is selected for estimation of the structural system equation model. Finally, a Monte Carlo simulation method is applied for sensitivity analysis of the regression model. Tourism growth affects economic growth positively and statistical significantly in two emerging countries such as China and Mexico based on tourism-led growth theory.

Keywords

Economic Growth, Tourism Growth, System Equation Model, Monte Carlo Simulation, Sensitivity Analysis

1. Introduction

The most empirical studies hold up the tourism-led growth hypothesis since a stable economic system is an impetus in tourism growth either in developed or developing countries (Balaguer & Contavella-Jorda, 2002; Lokman & Abdulnasser, 2005; Aslan, 2014; Tang & Tan, 2015).

China as a member of BRICS, one of the richest emerging countries worldly, tends to be one of the most competitive economies worldly following Japan, United States of America and Russia. Specifically, China is an emerging country with powerful economy belonging in *BRICS*, the five most emerging countries worldly, namely Brazil, Russia, India, China and South Africa.

The BRICS members develop their trading transactions mainly in regional

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level. The nerve center of the New Development Bank has been established in Shanghai of China. The initial capital of the NDB is $50 billion and is equally allocated to the originating members. In 2011, an independent international organisation with intention to achieve cultural, political and commercial cooperation among BRICS nations, the BRICS Forum was formed. Mainly, the activities of this international organisation are concentrated on funding the developing or underdeveloped countries in urgent economic situations like in cases of an economic crisis period, substituting the role of World Bank and International Monetary Fund, creating a safety deposit capital of saving for these countries. Mexico's ultimate goal is to participate in this political organization as a new candidate member in the direct future. Tourism sector stimulates economic growth both in China and Mexico, two emerging countries enriched with so important history and tradition.

2. Literature Review

Lokman & Abdulnasser (2005) ascertained that tourism promotes economic growth in Turkey, since economic policies in Turkey are mainly focused on the development of tourism industry and market. Dritsakis (2004) proved that there is a strong causality among real effective exchange rate and international tourism earnings and economic growth in Greece estimating Granger causality test for the period 1960-2000.

Balaguer & Cantavella-Jordá (2002) confirmed that tourism stimulates economic growth in Spain in the long-run. External competition has leaded to the expansion of international tourism in Spain the last three decades. The ultimate goal of government's policy was to increase tourist arrivals and investments in Spain.

Katircioglu (2009) concluded that economic growth Granger-cause tourism and trade development in the long-run. Additionally, the rapid growth of international trade contributed to a relative increase in international tourist arrivals in Cyprus the last decades.

Cortes-Jimenez & Pulina (2010) certified the influencing role of inbound tourism to economic growth emphasizing on the evolution of tourism expansion of two developed countries such as Spain and Italy. Brida & Risso (2010) indicated that tourism development Granger-cause economic growth, but not vice versa, for South Tyrol and Germany estimating Granger causality test for the sample period 1980-2006. In addition, Dritsakis (2012) resulted that there is a long-run equilibrium relationship between tourism and economic growth conducting a panel cointegration analysis in seven Mediterranean countries for the time period 1980-2007.

Pablo-Romero & Molina (2013) inferred that the nexus between tourism and growth is highly affected by the degree of specialisation in tourism. The model hypothesis of their study predicted that tourism, exports, investments and consumption boost economic growth for Mexico and China. Finally, Bilen et al.

(2015) found a bilateral causality between tourism and economic growth studying a panel Granger causality tests for 12 Mediterranean countries in the whole period 1995-2012.

Furthermore, Roudi et al. (2019) highlighted the positive effects of energy consumption and foreign direct investments on tourism growth applying modern heterogeneous panel cointegration methods for the small island developing states for the period 1995-2014. Finally, Eyuboglu & Eyuboglu (2020) verified the existence of an asymmetric causality between tourism development and economic growth in 9 emerging countries studying the period 1995-2016.

3. Data and Methodology

This empirical study attempts to analyse the empirical nexus between tourism and economic growth, considering the positive effect of exports, investments and consumption. For this purpose, a system equation model is estimated by a seemingly unrelated regression (SURE) method for two emerging countries worldly such as China and Mexico. Then, a Monte Carlo simulation method is selected for sensitivity analysis of the regression model. Finally, Theil's inequalities indices are accounted for the comparison of sensitivity analysis of the estimated results.

Assume that each equation estimated with ordinary least squares method is tested for linearity existence. As well, seemingly unrelated regression (SURE) method is adopted for estimation of the structural system equation model.

Therefore, the model has the following general form:

$$LGDP_t = c_1 + c_2 LTAR_{t-i} + c_3 LX_{t-i} + c_4 LINV_{t-i} + c_5 LCS_{t-i} + u_{1t} \quad (1)$$

$$LTAR_t = c_6 + c_7 LGDP_{t-i} + c_8 LFDI_{t-i} + c_9 LAIR_{t-i} + c_{10} LTAR_{t-i} + u_{2t} \quad (2)$$

$$LX_t = c_{11} + c_{12} LGDP_{t-i} + c_{13} LFDI_{t-i} + c_{14} LM_{t-i} + c_{15} LX_{t-i} + u_{3t} \quad (3)$$

$$LINV_t = c_{16} + c_{17} LGDP_{t-i} + c_{18} LX_{t-i} + u_{4t} \quad (4)$$

$$LCS_t = c_{19} + c_{20} LGDP_{t-i} + c_{21} LTAR_{t-i} + c_{22} LOP_{t-i} + c_{23} LCS_{t-i} + u_{5t} \quad (5)$$

More specifically the acronyms of the examined variables are explained as follows:

GDP = gross domestic product

TAR = tourist arrivals

X = exports

INV = investments

CS = consumption

FDI = foreign direct investment

AIR = air transport services

M = money supply

OP = trade of openness

L = logarithm

t = time trend

t-i = lagged time trend

u = white noise

$c_1, \cdots, c_{23}$ = coefficients

Based on empirical studies of Adamopoulos & Vazakidis (2019), Adamopoulos & Thalassinos (2020), economic growth is measured by the real gross domestic product (GDP), tourism growth is expressed by tourist arrivals (TAR), and finally investments (INV) are denoted by the gross fixed capital formation.

The sample period ranges from 1995 to 2017, with reference to 2010 as a constant year. The data sample has been obtained from the statistical database of World Bank (2018), while their logarithmic values intend to achieve better estimation results. Eviews 10.0 (2017) software conducts these statistical tests. The system equation model includes five linear equations with five dependent variables ($LGDP_t$, $LTAR_t$, LX_t, $LINV_t$, LCS_t) as it can be seen in Equations (1)-(5).

Theoretical hypotheses of this empirical study are analyzed as follows:

- An increase of tourist arrivals, exports, investment and consumption leads to an increase of gross domestic product.
- An increase of gross domestic product, foreign direct investments and air transport services leads to an increase of tourist arrivals.
- An increase of gross domestic product, foreign direct investments and money supply leads to an increase of exports.
- An increase of gross domestic product and exports leads to an increase of investment.
- An increase of gross domestic product, tourist arrivals and trade of openness leads to an increase of consumption.

The structure of the system equation model based on main theoretical hypotheses is depicted in **Figure 1**. Obviously, the nexus between tourism and economic growth is dependent on other determinants such as the direct or indirect effect of investment, consumption, exports, foreign direct investment, money supply, trade of openness.

3.1. Unit Roots Theory

As referred in empirical studies of Choi (1992), Chang (2002), Kwiatkowski et al. (1992) define the existence of stationarity of time series based on Augmented Dickey-Fuller test. Kwiatkowski et al. (1992) notice that the null hypothesis states that the time series is stationary while the alternative hypothesis implies the opposite. Time series become stationary in their first differences and integrated of the same order.

According to Kwiatkowski et al. (1992), as referred in studies of Chang (2002), Chang & Caudill (2005), Dritsakis & Adamopoulos (2004), Laopodis & Sawhney (2007), the KPSS test supposes that a time series may include three components, a time trend, a random walk and a stationary error: $y_t = \delta_t + r_t + \varepsilon_t$ where r_t is a random walk $r_t = r_{t-1} + u_t$.

The basic hypothesis implies that $\sigma_u^2 = 0$, so there is stationarity. KPSS unit

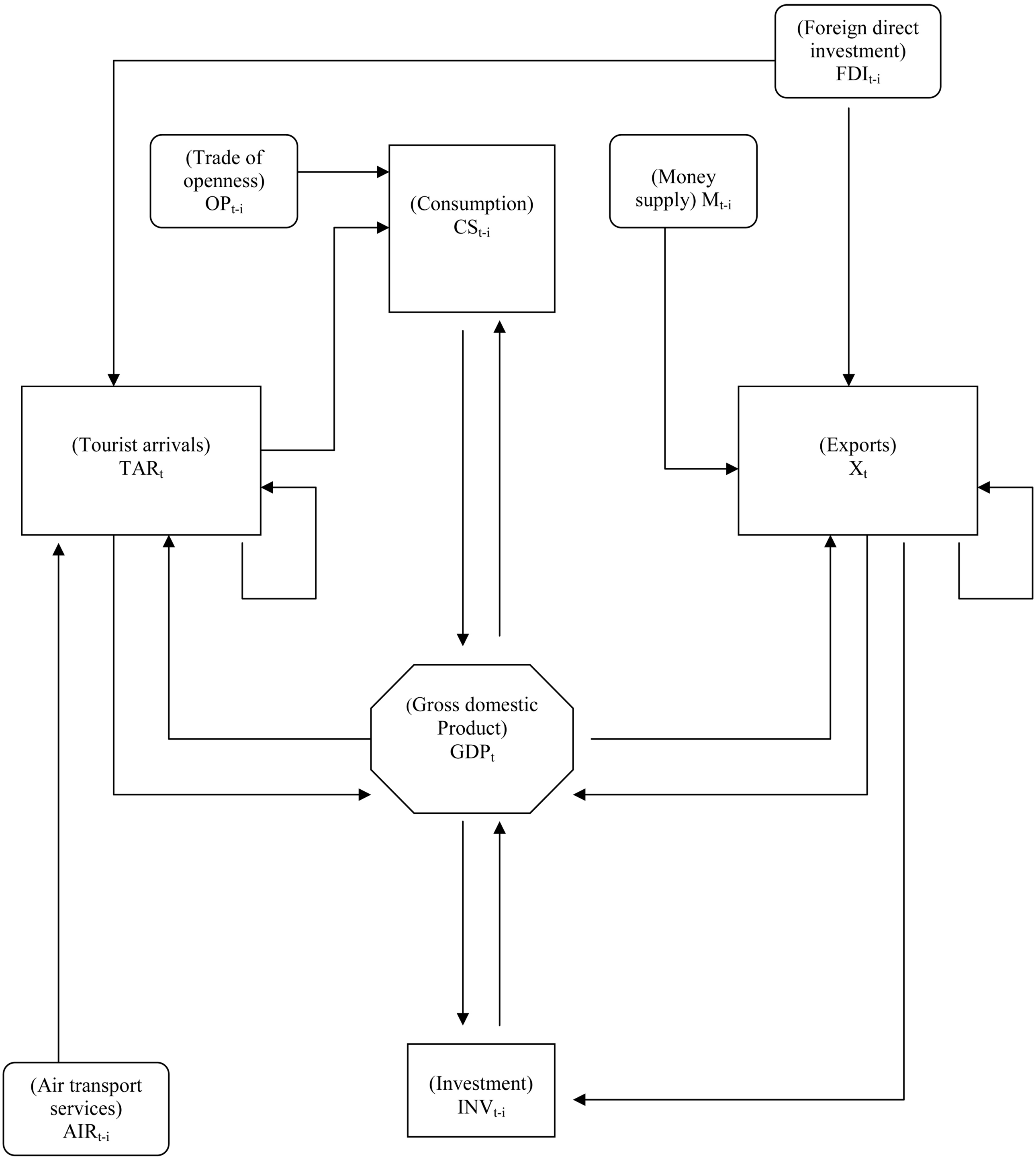

Figure 1. Structure of the system equation model.

root test is based on estimation of Lagrange multiplier statistical test $LM = T^{-2}\sum_{t=1}^{T} S_t^2 / S_{\varepsilon t}^2$ where $S_{\varepsilon t}^2$ is the variance of ε_t namely $S_t = \sum_{i=1}^{t} e_i$, $t = 1, 2, \cdots, T$ (Phillips, 1986; Newey & West 1987). The results of KPSS unit root tests for each variable are observed in **Table 2**.

3.2. Seemingly Unrelated Regression Estimation (SURE) Method and Monte Carlo Simulation

Seemingly unrelated regression (SURE) method defines the simultaneous system equation model solution, while Monte Carlo simulation method is selected for estimations of simulated model in order to make economic predictions (Seddighi et al., 2000). *Simulation policies* are conducted to define the *predictive ability* of the regression model. The best predictive ability is ascertained by the lower values of inequalities ratios indices of Theil, such as the bias, variance and covariance ratios respectively as follows:

$$U = \frac{\sqrt{\frac{1}{T}\sum\left(x_t^{sim} - x_t\right)^2}}{\sqrt{\frac{1}{T}\sum\left(x_t^{sim}\right)^2} + \sqrt{\frac{1}{T}\sum\left(x_t\right)^2}} \quad \text{Theil index} \tag{6}$$

$$U^M = \frac{\overline{x}^{sim} - \overline{x}}{\frac{1}{T}\sum\left(x_t^{sim} - x_t\right)^2} \quad \text{bias ratio} \tag{7}$$

$$U^S = \frac{\left(s_{x^{sim}} - s_x\right)^2}{\frac{1}{T}\sum\left(x_t^{sim} - x_t\right)^2} \quad \text{variance ratio} \tag{8}$$

$$U^C = 1 - \left(U^M + U^S\right) \quad \text{covariance ratio} \tag{9}$$

The better predictability of the regression model is succeeded by the lower values of the estimated dynamic multipliers and inequalities ratios indices respectively. For this purpose bias (U^M), variance (U^S) and covariance (U^C) ratios are accounted for all examined variables for both countries. The regression model is perfectly adjusted, when Theil indices are equal to zero (Katos, 2004). Sensitivity analysis discriminates how close the simulated values to actual values of time series are. Consequently, as closer the distance between the simulated and the actual values of time series as better simulation of the regression model is achieved (Seddighi et al., 2000).

4. Empirical Results

The descriptive statistics of data variables are shown in **Table 1**. The KPSS unit root test is applied for testing the stationarity of data variables according to Kwiatkowski et al. (1992). Obviously, all data variables are stationary and integrated of order one (see **Table 2**, **Figure 2**). Finally, the empirical results of seemingly unrelated regression estimation (SURE) method are depicted in **Table 3**. As it can be derived from the estimated results for China, an increase in tourist arrivals per 1% causes a relative increase in GDP a per 0.11, an increase in exports per 1% causes a relative increase in GDP per 0.3, an increase in consumption per 1% causes a relative increase in GDP per 0.4, while for Mexico an increase in tourist arrivals per 1% causes a relative increase in GDP per 0.04, an increase in consumption per 1% causes a relative increase in GDP per 0.002, an

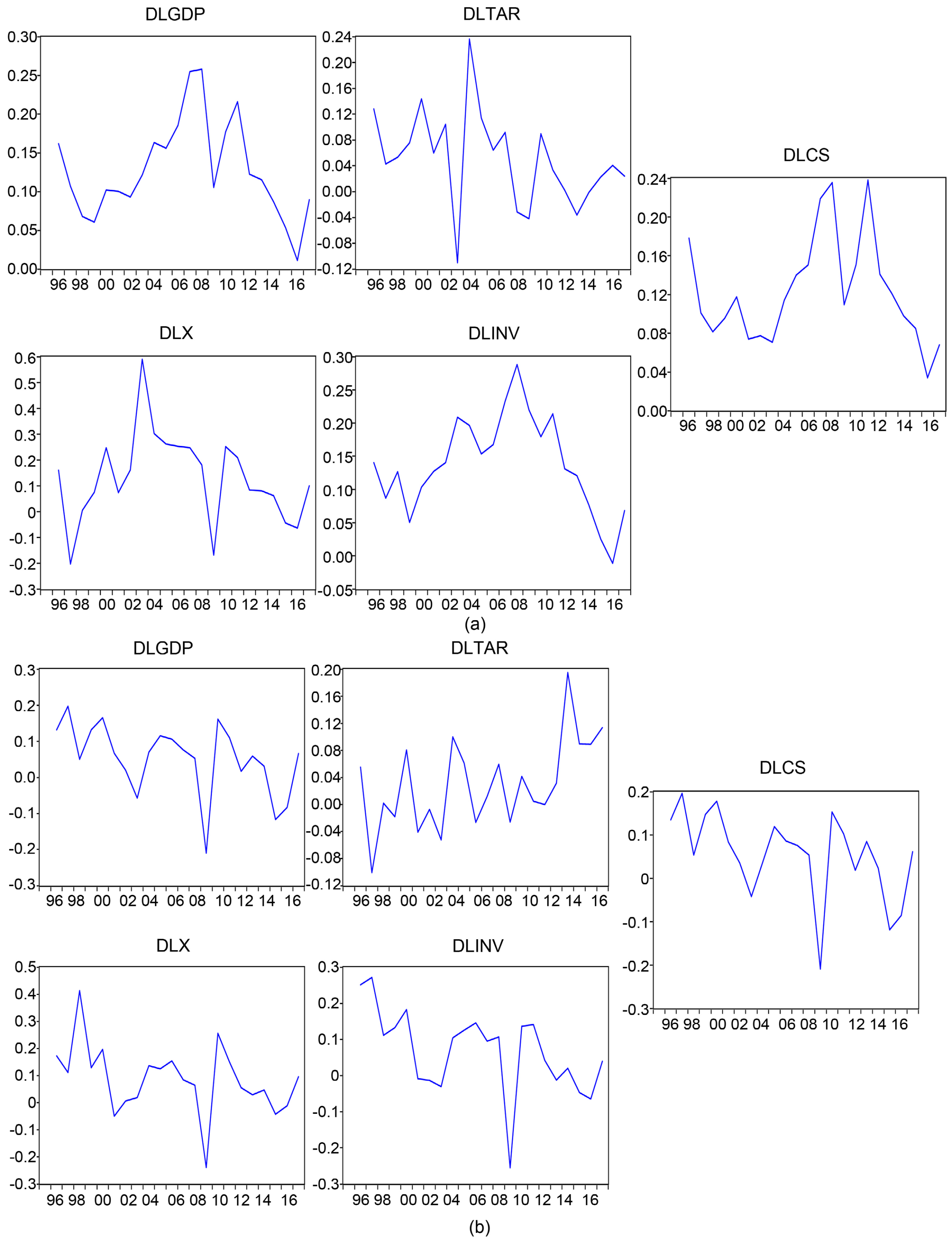

Figure 2. (a) Stationary unit roots graphs—China. (b) Stationary unit roots graphs—Mexico (values in their first differences are presented in vertical axis; years are presented in horizontal axis).

Table 1. Summary descriptive statistics.

CHINA	LGDP	LTAR	LX	LINV	LCS
Mean	−0.684437	−0.295783	−0.869584	−0.824431	−0.556538
Median	−0.796066	−0.109034	−0.512327	−0.919922	−0.714371
Std. Dev.	0.973647	0.363704	1.151366	1.090151	0.900407
Skewness	0.070076	−0.657418	−0.279812	0.010619	0.138529
Kurtosis	1.483352	1.948027	1.411310	1.466286	1.576996
MEXICO	LGDP	LTAR	LX	LINV	LCS
Mean	−0.230539	−0.014743	−0.342530	−0.258817	−0.225847
Median	−0.161461	−0.075047	−0.255667	−0.136622	−0.153384
Std. Dev.	0.369316	0.200136	0.563038	0.436023	0.379771
Skewness	−0.814059	1.433291	−0.714339	−0.946972	−0.897771
Kurtosis	2.676853	4.105904	2.561996	3.095647	2.811302

increase in consumption per 1% causes a relative increase in GDP per 0.7 (Table 3).

Therefore, tourism growth, exports, investments, tourist arrivals affect positively and significantly economic growth in two emerging countries, China and Mexico. In addition, in China foreign direct investments boost economic growth indirectly through the increase of exports and tourist arrivals, while an increase of tourist arrivals causes a simultaneous increase of consumption (Figure 3(a)). In Mexico, air transport services have a positive effect on economic growth indirectly via increase of tourist arrivals, money supply affects positively economic growth indirectly via increase of exports, and finally trade of openness affects positively economic growth indirectly via increase of consumption (Figure 3(b)).

Finally, the estimation results of Monte Carlo simulation method indicated that the simulated values of data variables are very close to actual one, so the simulation models are highly reliable in both emerging countries (Figure 4). Comparatively, considering the estimation results of inequalities ratios indices, it can be inferred that the values of Theil's indices for gross domestic product, investments, exports and consumption are lower in China than in Mexico, while Theil's index of tourist arrivals is lower in Mexico than in China. Therefore, there is a good predictive ability of simulated system equation models for both emerging countries, such as China and Mexico. However, China has better simulated model comparing the Theil's indices for dependent variables than Mexico (see Table 4, Figure 5).

5. Conclusion

This study investigated the empirical nexus between tourism and economic

Table 2. (a) Tests of unit roots hypothesis. (b) Tests of unit roots hypothesis.

(a)

CHINA	*KPSS*	
	LM_test stat	
	h_c	h_t
LGDP	0.67 (lag = 3)	0.10 (lag = 3)
LTAR	0.63 (lag = 3)**,***	0.17 (lag = 3)**,***
LX	0.53 (lag = 4)**,***	0.12 (lag = 1)***
LINV	0.66 (lag = 3)**,***	0.09 (lag = 3)
LCS	0.67 (lag = 3)**,***	0.117 (lag = 3)
DLGDP	0.85 (lag = 2)	0.16 (lag = 2)*
DLTAR	0.42 (lag = 2)*,**	0.12 (lag = 7)*,**
DLX	0.26 (lag = 0)*,**,***	0.16 (lag = 1)*
DLINV	0.17 (lag = 3)*,**,***	0.15 (lag = 1)*
DLCS	0.13 (lag = 2)*,**,***	0.17 (lag = 1)*

The critical values at 1%, 5% and 10% are 0.73, 0.46 and 0.34 for h_c and 0.21, 0.14 and 0.119 for h_t respectively (Kwiatkowski et al. (1992), **Table 1**). Indicate that those values are not consistent with relative hypotheses at the 1%, 5% and 10% levels of significance relatively. *,**,*** denote not statistical significance in 1%, 5%, 10% levels of sig. respectively.

(b)

MEXICO	*KPSS*	
	LM_test stat	
	h_c	h_t
LGDP	0.64 (lag = 3)**,***	0.19 (lag = 2)**,***
LTAR	0.56 (lag = 3)**,***	0.17 (lag = 3)**,***
LX	0.66 (lag = 3)**,***	0.16 (lag = 2)**,***
LINV	0.64 (lag = 3)**,***	0.18 (lag = 2)**,***
LCS	0.62 (lag = 3)**,***	0.19 (lag = 2)**,***
DLGDP	0.47 (lag = 0)**,***	0.27 (lag = 11)
DLTAR	0.49 (lag = 2)*	0.12 (lag = 5)*,**
DLX	0.35 (lag = 4)*,**	0.18 (lag = 6)*
DLINV	0.48 (lag = 1)*	0.13 (lag = 5)*,**
DLCS	0.54 (lag = 0)*	0.17 (lag = 5)*

The critical values at 1%, 5% and 10% are 0.73, 0.46 and 0.34 for h_c and 0.21, 0.14 and 0.119 for h_t respectively (Kwiatkowski et al. (1992), **Table 1**). Indicate that those values are not consistent with relative hypotheses at the 1%, 5% and 10% levels of significance relatively. *, **, *** denote not statistical significance in 1%, 5%, 10% levels of sig. respectively.

Table 3. Seemingly unrelated regression estimation (SURE) method.

China

$$LGDP_t = 0.02 + 0.11LTAR_t + 0.08LX_{t-3} + 0.38LINV_t + 0.47LCS_{t-i} + u_{1t} \quad (1a)$$

$$LTAR_t = 0.01 + 0.19LGDP_t + 0.20LFDI_t + u_{2t} \quad (2a)$$

$$LX_t = 0.16 + 0.60LGDP_t + 0.72LFDI_t + u_{3t} \quad (3a)$$

$$LINV_t = 0.09 + 0.79LGDP_{t-1} + 0.27LX_{t-1} + u_{4t} \quad (4a)$$

$$LCS_t = 0.34 + 0.74LGDP_{t-2} + 0.37LTAR_{t-4} + u_{5t} \quad (5a)$$

Mexico

$$LGDP_t = -0.014 + 0.04LTAR_t + 0.002LX_t + 0.14LINV_t + 0.78LCS_t + u_{1t} \quad (1b)$$

$$LTAR_t = 0.12 + 0.13LGDP_{t-3} + 0.23LAIR_t + 0.60LTAR_{t-2} + u_{2t} \quad (2b)$$

$$LX_t = 0.07 + 0.67LGDP_{t-1} + 0.99LM_{t-1} + 0.12LX_{t-4} + u_{3t} \quad (3b)$$

$$LINV_t = 0.01 + 0.36LGDP_{t-1} + 0.45LX_t + u_{4t} \quad (4b)$$

$$LCS_t = -0.18 + 0.49LGDP_{t-1} + 0.28LOP_t + u_{5t} \quad (5b)$$

Table 4. Estimations of Theil inequalities indices.

Countries	U-Theil$_{GDP}$	U-Theil$_{INV}$	U-Theil$_X$	U-Theil$_{CS}$	U-Theil$_{TAR}$
China	0.1562	0.1615	0.0950	0.1792	0.5221
Mexico	0.3411	0.3321	0.1970	0.2999	0.1256

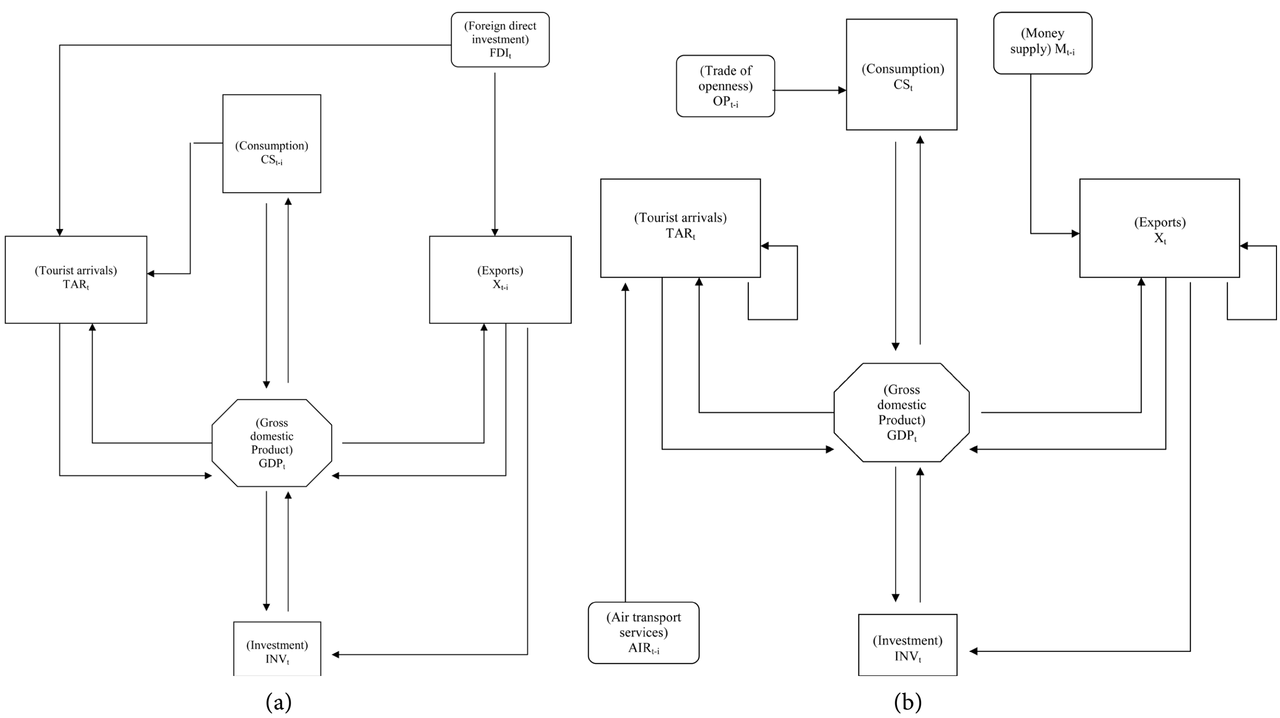

Figure 3. (a) System equation model of China. (b) System equation model of Mexico.

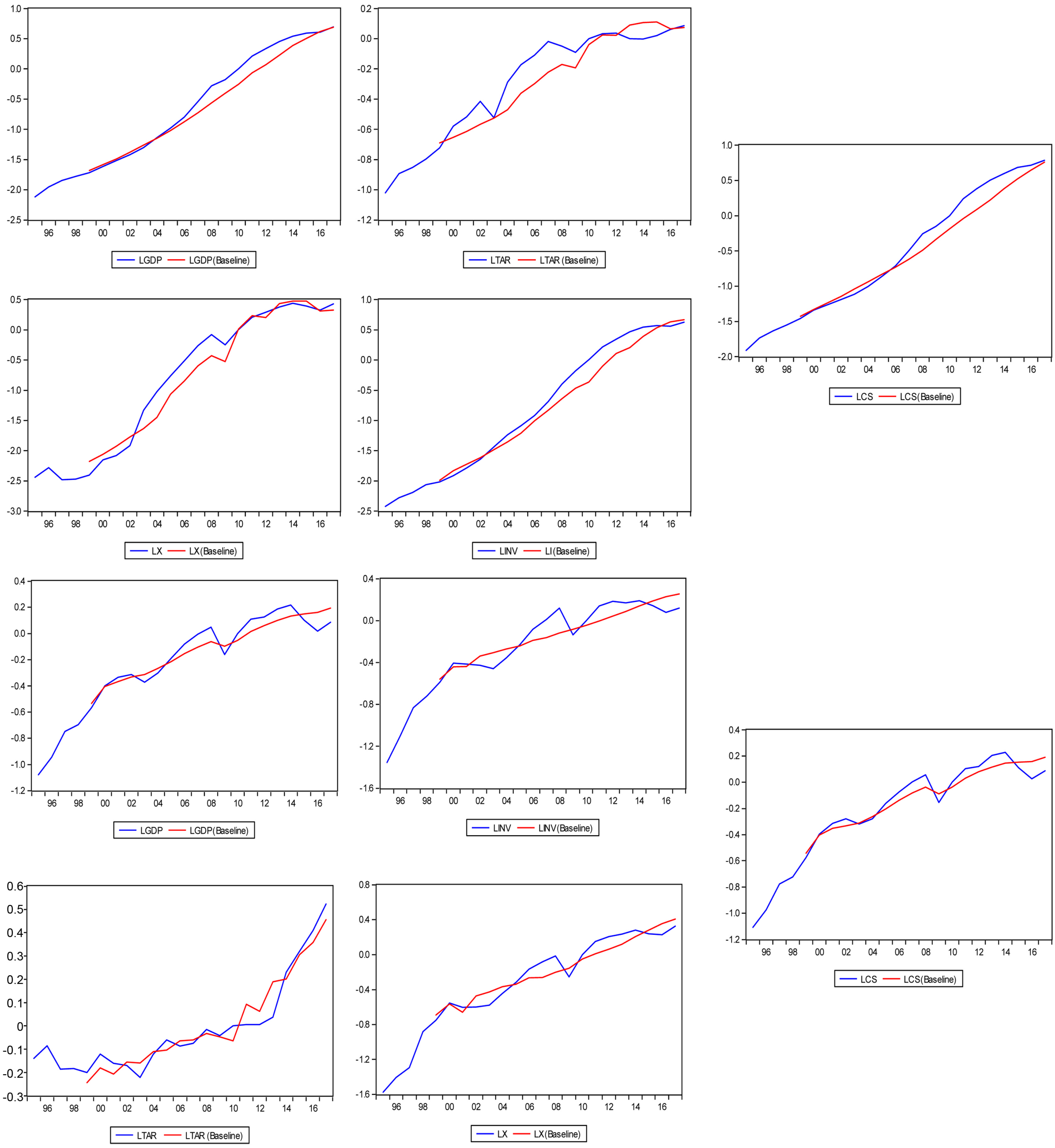

Figure 4. Monte Carlo simulation (values of U-theil indices are presented in vertical axis; years are presented in horizontal axis).

growth for two emerging economies such as China and Mexico covering the time period from 1995 to 2017. The main goal of this study was to estimate a simultaneous system equation model applying a seemingly unrelated regression method. Finally, Monte Carlo simulation method examined the predictive ability of the regression model and the sensitivity analysis estimating Theil's inequalities indices.

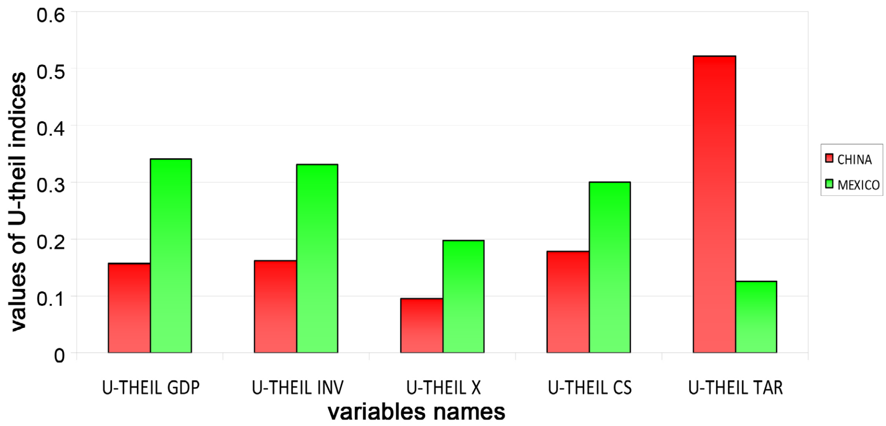

Figure 5. Graph of Theil inequalities indices.

Tourism growth affects positively and significantly economic growth in two emerging countries, such as China and Mexico. Also, exports, investments and consumption affect economic growth directly, while foreign direct investments affect economic growth indirectly in China. Moreover, money supply, trade of openness and air transport services affect economic growth indirectly in Mexico. Summarizing, this empirical study proved that China has better simulated equation model variables than Mexico estimation inequalities ratios.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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