Energy Consumption, CO2 Emissions, and Tourist Arrivals to Small Island Economies Dependent on Tourism

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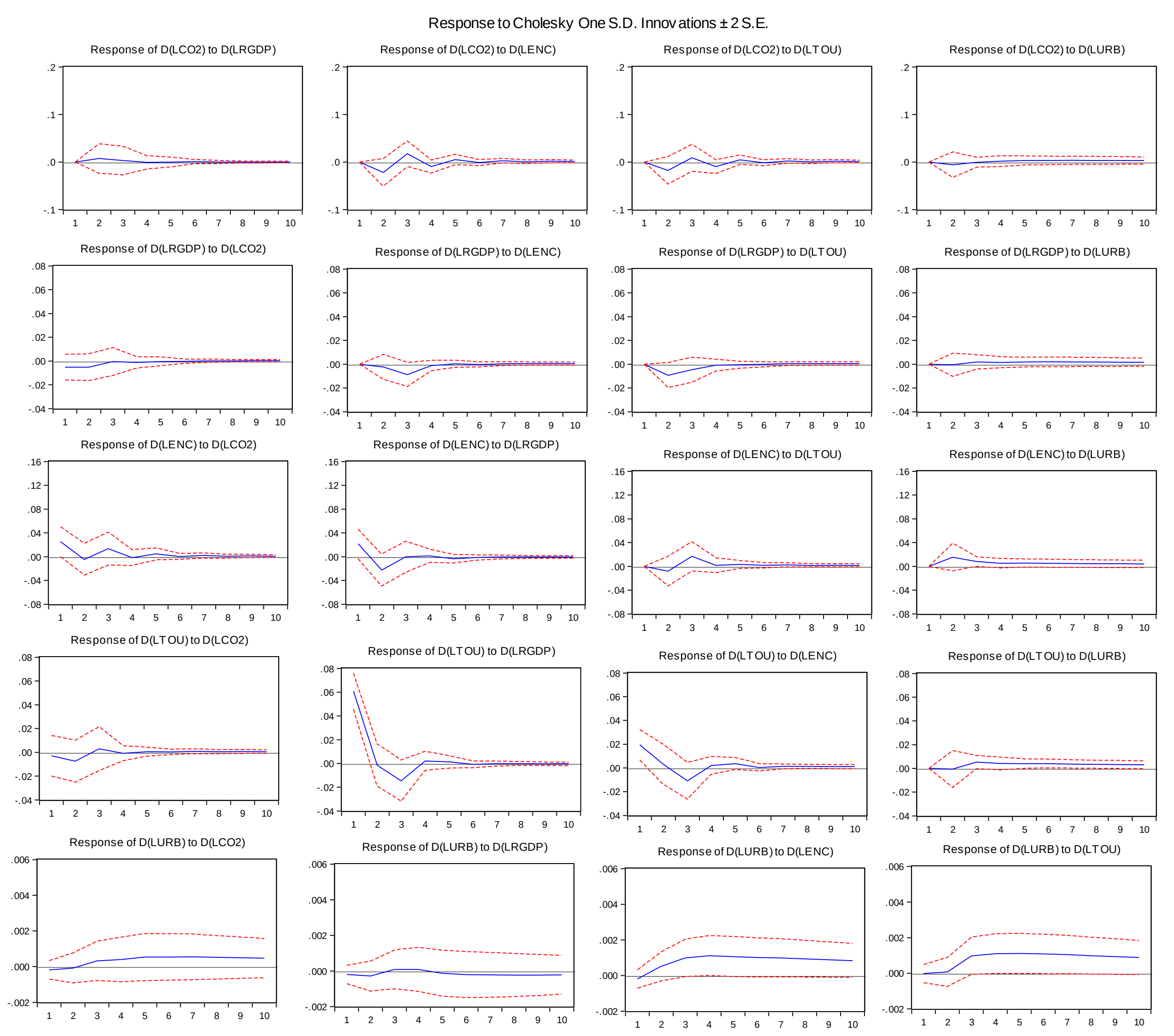
ABSTRACT

In less than two decades, the global tourism industry has overtaken the construction industry as one of the bigger polluters, accounting for up to 8% of global greenhouse gas emissions. Consequently, research into the causal link between emissions and the tourism industry have increased significantly focusing extensively on top earners from the industry. However, few studies have thoroughly assessed this relationship for small island economies dependent on tourism. Hence, this study assessed the causal relationship between CO2 emissions, real GDP per capita (RGDP) and the tourism industry. The analysis is conducted for seven tourism-dependent countries for the period 1995 to 2014 using panel VAR approach. Unit root tests confirms all variables are stationary at first difference. Our VAR granger causality/block exogeneity Wald tests results show that a unidirectional causality flowing from tourism to CO_2 emission, RGDP, and energy consumption, but a bi-directional causality exists between tourism and urbanization. This implies that in countries that depend on tourism, the behavior of CO_2 emission, RGDP, and energy consumption can be predicted by the volume of tourist arrivals, but not the other way around. The impulse response analysis also shows that the responses of tourism to shocks in CO_2 appear negative within the 1st year, positive within the 2nd and 3rd year but revert to equilibrium in the fourth year. Finally, the reaction of tourism to shocks in energy consumption is similar to its reaction to shocks in RGDP. Tourism responds positively to shocks in urbanization throughout the periods. Consequently, this study draws important energy and tourism policy implications.

RESPONSE OF TOURISM TO SHOCKS – IMPULSE RESPONSE ANALYSIS



KEYWORDS

Tourism;

Energy Consumption;

GDP;

Impulse response;

Variance decomposition.

Figure 1. Energy consumption, CO_2 Emissions and Real GDP per capita in selected tourism dependent economies

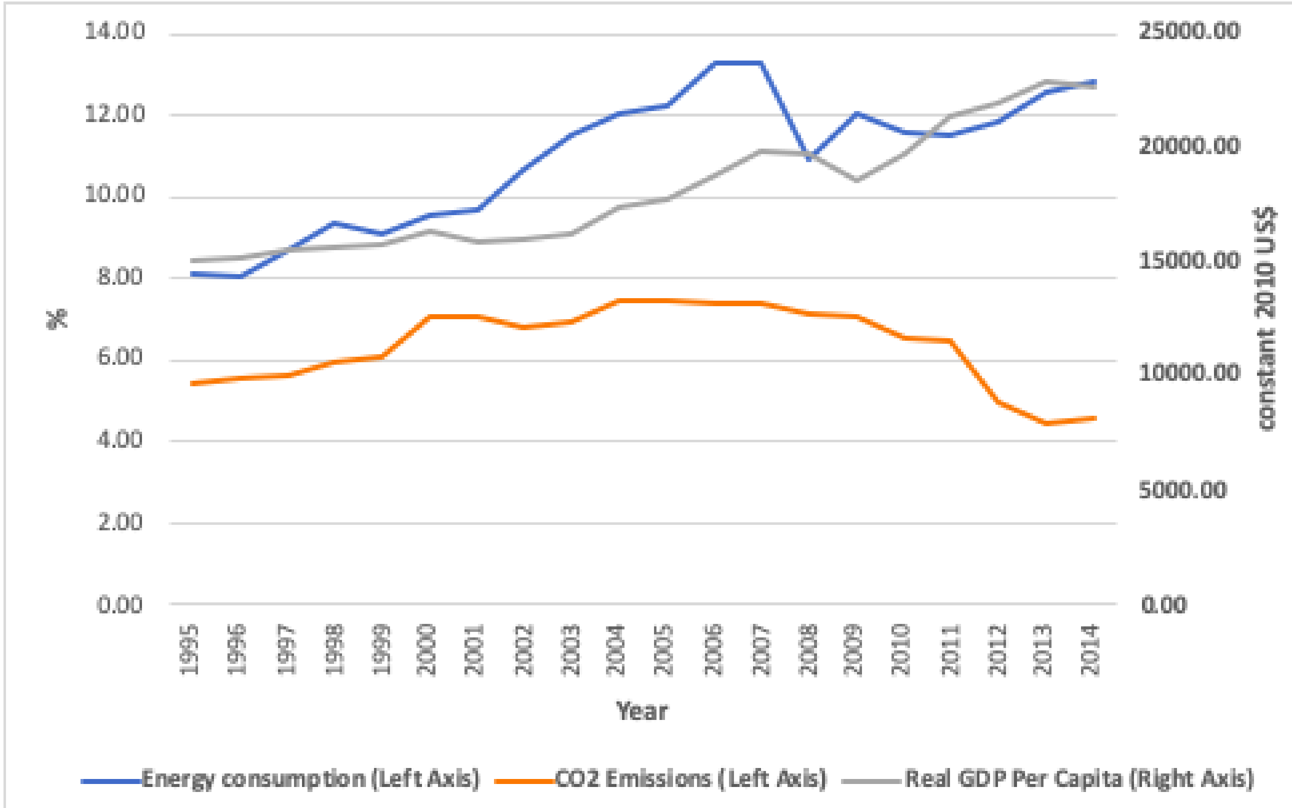
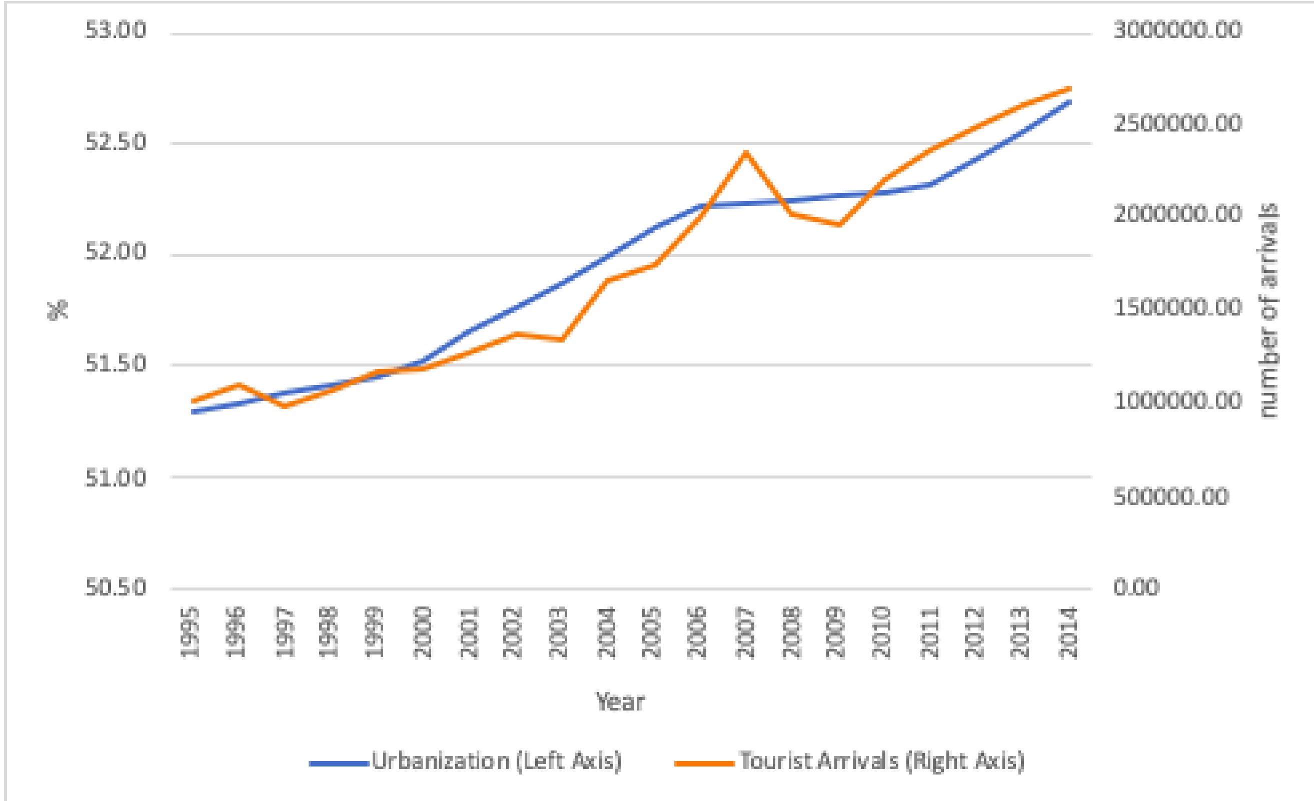


Figure 2. International tourist arrivals and share of Urban population in selected tourism dependent economies



IMPLICATIONS FOR THEORY, PRACTICE, AND POLICY

- The findings of this research are vital for achieving sustainable tourism and environmental objectives. As expected, unlike in countries that do not depend heavily on tourism (Nepal et al., 2019) or those who depend on resources such as crude oil (Adedoyin, et. al. 2017), international tourist arrivals account for more variation in real GDP per capita in tourism dependent economies.
- As with existing studies, energy consumption accounts for variation in CO2 emissions which is followed by international tourist arrivals. This necessitates more government policies that caters for mitigating deteriorating global climate, since long term consequences can hamper the growth of the economy.
- Also, in the long run increase in energy consumption could prevent tourists from visiting or reducing visits to destinations that rely heavily on them, due to uncontrolled environmental damage.
- Consequently, unlike coal energy (Adedoyin et al., 2020) energy from green sources and other existing renewable sources should be giving more consideration for every tourism service provided or product sold in the tourism industry of these countries.
- Additionally, since tourism dependent economies are mainly attractive destinations, it is vital to revisit and/or pay attention to the maximum capacity of the travel industry to help in creating a workable balance with urban-rural drift since many of these countries are developing countries.

METHOD: PANEL VECTOR AUTOREGRESSIVE MODEL [PVAR]

The PVAR model is given by:

$$Y_{it} = \theta_i + A(L)Y_{it} + \beta_i + \delta_t + \epsilon_{it} \qquad (1)$$

Where *i* and *t* subscript represent country and time respectively; Y_{it} represents the vector of CO2 emissions, real GDP per capita, energy consumption, tourist arrivals and urbanization; country-specific fixed effect matrix is represented by θ_i; *A(L)* is a matrix of lag operator; β_i and δ_t represents each country's individual and time effects respectively; and ϵ_{it} is the vector of residuals. We use the log form of the variables to ensure a more stable behaviour. Equation (1) form of the PVAR model is further expressed to capture the variables of interest as given below:

$$\Delta L(CO2_{it}) = \theta_{1i} + \sum_{j=1}^{\rho} a_{1j}\,\Delta L(CO2_{it-j}) + \sum_{j=1}^{\rho} b_{1j}\,\Delta L(RGDP_{it-j}) + \sum_{j=1}^{\rho} c_{1j}\,\Delta L(ENC_{it-j}) + \sum_{j=1}^{\rho} d_{1j}\,\Delta L(TOU_{it-j}) + \sum_{j=1}^{\rho} e_{1j}\,\Delta L(URB_{it-j}) + \beta_{1i} + \delta_{1t} + \epsilon_{1it} \qquad (2)$$

DATA

- This study uses annual data covering 1995 to 2014 for Antigua and Barbuda; Aruba; Bahamas; Macao; Maldives; Seychelles; and Vanuatu to examine the causal link among tourist arrivals, real GDP per capita, energy consumption, urbanization and CO2 emissions.
- Our study differs from Farhani and Ozturk (2015) which focused on assessing causal links between trade openness, urbanization and other variables.
- This study also differs from Akadiri et al. (2018), by focusing on international arrivals links with CO2 emissions for highly tourism dependent economies instead of tourism island territories.

$$\Delta L(RGDP_{it}) = \theta_{2i} + \sum_{j=1}^{\rho} a_{2j}\,\Delta L(CO2_{it-j}) + \sum_{j=1}^{\rho} b_{2j}\,\Delta L(RGDP_{it-j}) + \sum_{j=1}^{\rho} c_{2j}\,\Delta L(ENC_{it-j}) + \sum_{j=1}^{\rho} d_{2j}\,\Delta L(TOU_{it-j}) + \sum_{j=1}^{\rho} e_{2j}\,\Delta L(URB_{it-j}) + \beta_{2i} + \delta_{2t} + \epsilon_{2it} \qquad (3)$$

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$$\Delta L(URB_{it}) = \theta_{5i} + \sum_{j=1}^{\rho} a_{5j}\,\Delta L(CO2_{it-j}) + \sum_{j=1}^{\rho} b_{5j}\,\Delta L(RGDP_{it-j}) + \sum_{j=1}^{\rho} c_{5j}\,\Delta L(ENC_{it-j}) + \sum_{j=1}^{\rho} d_{5j}\,\Delta L(TOU_{it-j}) + \sum_{j=1}^{\rho} e_{5j}\,\Delta L(URB_{it-j}) + \beta_{5i} + \delta_{5t} + \epsilon_{5it} \qquad (6)$$

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