Tourism Development, Natural Resource Abundance, and Environmental Sustainability: Another Look at the Ten Most Visited Destinations.

Abstract

Tourism contributes approximately one-fifth to total global employment. However, growth in tourism can promote an increase in transportation, energy consumption, natural resource exploration, and consequential ecological distortions. This study applies a battery of second-generation econometric techniques to investigate the influence of tourism development and natural resource on a comprehensive environmental indicator; the ecological footprint (EF), in the ten most visited destinations. The findings show that tourism receipts have an increasing effect on EF, while tourism arrivals have a reducing effect on EF. The country-wise results reveal that tourism receipts increase the EF in China, Italy, Spain, and the UK, while the reverse holds true for France, Germany, Thailand, Turkey, Mexico, and the US. The influence of natural resource on the EF is mixed. Natural resource increases the EF in China, France, Germany, Spain, and the UK. A feedback causality exists among EF, natural resource, and tourism development. Policy directions are discussed.

Keywords: Tourism Development; Ecological Footprint; Natural Resource; Urbanization; Energy Intensity; AMG.

1. Introduction

Tourism is a concept synthesized from contemporary social organizations. It is intertwined with other concepts such as travels, pilgrimage, and such like. This has brewed several forms, some of which are "business tourism", "sports tourism", "medical tourism", "heritage tourism" (Walton, 2018). (Tureac and Anca, 2014) also indicated various forms of tourism based on specific intentions, purposes, and geographical regions (migration). Emblematizing tourism is said to have been first noticed in Poser in 1939 (Tureac and Anca, 2014). Earlier than this, tourism is traceable in history to as far back as before the 17^{th} century, preceding the time the word "tourist" was fabricated, where there were arranged travels for sightseeing, pleasure-seeking, and the likes (Walton, 2018). International tourism which depends on travels and the transport industry has formed a formidable force globally but more vehemently in developing economies (International Civil Aviation Organization, 2018). However, this study looks at tourism development, natural resource abundance and environmental sustainability considering ten most visited tourism destinations. All forms of tourism that are listed earlier depend on travels, either domestically or internationally. The figure below (figure 1) confirms a consistent increase in tourist arrivals over the period 1995 to 2018.

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However, this study aims to investigate the effects which tourism development and natural resources pose on the ecological footprint in the ten most arrived countries. This is necessary considering the need for environmental sustainability while encouraging tourist's activities and full use of natural resources to combat global warming. The tourism industry is one with rapid growth. It is no doubt, a principal tool for economic growth and sustainable development. It has the prospects to provide solutions to the overwhelming problem of unemployment and increase income. Nevertheless, it has some implications for environmental quality. Such as the emissions, discharge of wastes, air pollution, deforestation, and so on. Securing the needs of the future and at the same time meeting our immediate needs is important. Environmental deteriorating activities cause climate change. Therefore there is a need to study the effect of activities in the tourism industry on the quality of the environment, considering its role in providing future needs, such as in (Kumar et al., 2018).

Meanwhile, the possibility of thorough exploration when including all countries across the globe is low, hence, the selection of the ten most visited. These countries (listed above) accounts for about 42 percent of the global tourist arrivals in 2017. We apply a battery of second-generation econometric techniques that address panel data issues like cross-sectional dependence (CD), heterogeneity, endogeneity, autocorrelation, heteroskedasticity, amongst others. Since international tourism only makes up about 16% of all tourism trips, the current study considers domestic tourism by adopting techniques that shows country-wise results which will help countries align their policies to be in tandem with their peculiarities. The Dumitrescu and Hurlin (DH) test to establish causality is to test whether or not tourism development and natural resource abundance affects ecological footprints. We look to establish the direction of causality between ecological footprints and other variables such as tourism development, natural resource abundance and economic growth. The study suggests that natural resource can actually drive growth especially when sustainability procedures are inculcated into resource exploration. Establishing bidirectional causality between natural resource and tourism receipt while no direction of causality between energy intensity and economic growth, and between natural resource and energy intensity.

Importantly, the outcome of this study is expected to initiate the formulation, design, and implementation of sustainable tourism policies. Again, these ten countries are a paradigm of the global tourism sector, an effective and viable tourism policy in these countries will serve as a good guide for global tourism. This study further boosts the literature by adopting EF instead of CO_2 emissions which has limited application. Therefore, the outcome of this study is likely to inform better and reliable policy directions.

Furthermore, in 2018, a five percent increase in tourism made international tourist arrivals reach 1.4 billion. This feat was predicted by the UNWTO to be achieved later in 2020 (World Tourism Organization, 2019). Also, by 4 percent, it was increased to 1.5 billion in 2019 (World Tourism Organization, 2020). It suggests that the growth rate of international tourist arrivals is higher than expected. Besides these facts, there has been a significant annual increase in tourist arrivals before 2018. This is not exclusive of technological advancement; innovations and new policies (such as the ease in visa acquisition) in the travel sector that has provided safe travels and more affordable costs; as well as economic growth (World Tourism Organization, 2019).

Global export earnings as well rose to USD 1.7 trillion in 2018 and about 2 percent of the global gross domestic product (GDP) (Blackall, 2019). These make the tourism sector an essential tool for economic growth. Tourism and travels grew in their total contribution to the global gross domestic product (GDP) from USD 8.811trillion in 2018 to USD 9.25 trillion in 2019. This accounts for 10.4 percent of the GDP. It is also expected to rise to USD 13.085 trillion in 2029 (this is about 11.5 percent of the Gross Domestic Product). It also accounts for about 319 million jobs (10 percent of the whole employments) in 2018 and expected to rise to about 421 million jobs (11.7 percent of the whole employments) in 2029 (World Travel and Tourism Council, 2019). Furthermore, in 2018, tourism and travel also stimulated USD 940.9 billion in capital investment. This is predicted to increase to USD 1.489 trillion in 2029 at a rate of 4.2% each year (World Travel and Tourism Council, 2019). (Ekanayake and Long, 2012; Khan et al., 2020; Vukadinovic et al., 2017) highlights the importance of tourism development to the GDP, investment, and employment creation. They all agree that tourism development impacts economic growth positively.

In fact, tourism and travel is said to straightly endow the sustainable development agenda for 2030, which was made by the United Nations and also helps its goals (International Civil Aviation Organization, 2018). "Meeting the requirements of the immediate generation and at the same time, securing the capacity of succeeding generations to meet up with their needs is the essence of substantial and enduring development." (World Commission on Environment and Development, 1987). The mirrors of tourism as described and adopted by the (UNWTO, 2008) are social, cultural, and economic views. Nonetheless, sustainable development has three fundamental pedestals which are social, economic, and environmental sustainability (Ahmad et al., 2018). Tourism development can help achieve economic growth and some of the SDGs, on the other hand, tourism development has a negative impact on the environment, especially on natural resources.

Also, two kinds of this impact were highlighted by (May, 1991) to, firstly be the consequences of erecting hospitality structures and tourism amenities and facilities. Hotels, restaurants, resorts, camps, and tourist structures have caused deforestation, limited land usable for agricultural activities, urbanization. These have a negative impact on the quality of the environment as some cause more emissions while some still remove natures' way of reducing them. Secondly, the implications of the tourists' presence in the destination. The presence of tourists in a destination imply that there would be wastes (solid and liquid). The accumulated disposal of these substances into the environment will affect the host community. As the tourism sector grows rapidly, there is also a heavy load on the natural resources of the host country. The position of technology and social establishment arouses the inability of the environment to provide the needs of immediate and subsequent generations (World Commission on Environment and Development, 1987). Additionally, tourism is intertwined with other concepts such as the hospitality sector. The development of hospitality and tourism systems technologically and structurally has created a greater dependency on natural resources. A greater intensity of energy resources, water resources, and so on are needed to power these systems. Energy use and tourism-accompanied enterprises are correlated with environmental deterioration (Ahmad et al., 2018). Little wonder (Ahmad et al., 2018) describes the tourism industry as one that is not any longer smoke-free. The persistent use of these resources, especially for energy generation will not only wear them out (as many of them are non-renewable) but will also increase emissions. Traffic and congestions also contribute largely to emissions (Kellner, 2016).

In this order, France, Spain, the United States of America (USA), China, Italy, Mexico, the United Kingdom (UK), Turkey, Germany, and Thailand were the ten most arrived countries across the globe in 2017. In a different order, they were also the most visited in 2016 (Atlas & Boots, 2019; *UNWTO Tourism Highlights: 2018 Edition*, 2018; World Economic Forum, 2020; Wright, 2020). To get this ranking order, tourist arrivals and receipt is considered. Of these ten destinations, seven made it to the top ten countries with the highest arrivals and receipt. Turkey recorded the highest percentage increase in tourist arrivals in 2017, having 24.1 percent, followed by Mexico and Italy with 12.0 percent and 11.2 percent respectively. The United States of America has the lowest with 0.7 percent. In tourism receipt, the United States of America is first, with the lowest increase (1.9 percent), though Mexico and Turkey are missing in the top ten (*UNWTO Tourism Highlights: 2018 Edition*, 2018).

In the section that follows, a detailed review of the arguments in the literature is presented, systematically highlighting tourism development, natural resource rent as well as economic growth and their attendant environmental impact. Section three details the data, variables and methodology used, while section four discusses the main findings of this study with vital environmental and tourism implications. This paper concludes in section five with relevant policy directions suggested.

2. Literature Review

2.1. Tourism Development and Ecological footprint

Tourism influences the environment positively and negatively. Thus, Sunlu (2003) stated that the relationship between the duo as complex. Negatively, there are effects of tourism activities such as the construction of airports, hotels, resorts, roads, restaurants, other infrastructures, and their operations on the environment. This happens mostly when the amount of tourist visits to a community is larger than the environment can condone. Positively, it is also accepted that tourism helps to preserve and conserve the environment, such as the keeping of the natural environment for tourism, this also raises its economic value. Several studies have been done to examine this relationship in different countries. Ozturk et al., (2016) utilized EF and gross domestic product (GDP) from tourism as an economic indicator to dig into the Environmental Kuznets' Curve (EKC) hypothesis from 1988 to 2008 in 144 countries. Their findings indicate that a greater number of the countries that inhibit a counteract interaction between the EF and GDP from tourism, energy consumption, urbanization, and trade openness are the average and above average income countries. This means that tourism deteriorates the environment in countries whose income is above average.

Furthermore, Paramati et al. (2017) engaged a contrasting study of the Eastern and Western European Union countries. The variables considered in their study include tourism (tourism receipts), economic advancement (measured by the Gross Domestic Product), and foreign direct investment (FDI), commerce, and carbon dioxide (CO_2) emissions. The outcomes are as follows: (a.) there exists cross-sectional dependence for all the considered variables (statistically consequential at 1% level). (b.) the variables are stationary at first differencing (hypothesis tested at 1% significance level). (c.) a long-term equilibrium interaction is present among the variables. (d.) in the eastern European Union countries, tourism is observed to increase carbon dioxide (CO_2) emissions while the reverse is noted in the western European Union countries. Complimenting Sunlu (2003), Ahmad et al., (2018) described tourism as a two-edged sword with the capability of making or marring the standard of the environment. They conducted the study of the relationship between tourism and the environmental quality for the period 1991 to 2016, on five provinces in (One Belt One Road) OBOR area of China. The outcome of the study expresses a negative interaction in four out of the five provinces and positive interaction in one. Mikayilov et al., (2019) used the time-varying coefficient co-integration technique (TVC), to evaluate the long-term effect development in tourism has on the EF in Azerbaijan for the duration 1996 to 2014. As deduced from the TVC technique, the co-adjuvant of tourism development, which is the income flexibility for a deteriorating environmental is observed to be time-invariant. The study also found the EKC hypothesis to be absent for the tie-up between tourism development and the ecological footprint in Azerbaijan.

In a multivariate study, Akadiri et al., (2020) investigated the orientation of the causality existing between tourism and environmental quality using carbon dioxide (CO_2) emissions as a stand-in. They applied the panel Granger causality testing technique introduced by (Kónya, 2006). Their study covers sixteen small island emerging economies. The study reveals that the relationship varies in different countries. Environmental pollution is driven by tourism. The direction of causality is often caused by internal factors. Dogan et al., (2020) checked the EKC hypothesis in the BRICS countries and Turkey. They used EF as a proxy to measure environmental degradation instead of conventional CO_2 emissions. This is because CO_2 emissions are believed to not really indicate the complex nature of environmental degradation. Their results affirmed the existence of the EKC. Kongbuamai et al., (2020) established a negative relationship between tourism and natural resources with EF in the ASEAN countries between 1995 and 2016. The outcome also indicates the presence of an upturned U-shaped EKC in the ASEAN countries.

2.2. Natural Resource Rent and Ecological Footprint

Zafar et al., (2019) studied the influence of natural resources, foreign direct investment (FDI), human capital, energy use, and economic advancement on the EF in the United States from 1970 to 2015. The results show that natural resources should be helpful in docking the EF in the United States. Also, there is a one-way directional causality moving from natural resources to EF. Evident from Pakistan, as studied by Hassan et al., (2019) indicates that natural resources assists in supporting the EKC hypothesis. The study also investigated the interactivity of economic advancement and natural resources on EF using ARDL modeling technique for long term estimation. A positive influence exists between natural resource and EF. This implies that there is a depletion in environmental quality. There is also a two-way directional connection between natural resource and EF.

A Quantile-Quantile analysis was employed together with the panel Ordinary Least Square (POLS) by Musibau et al., (2020) to study the EKC hypothesis in the Sub-Saharan African (SSA) region for the space of 1980 to 2018. They compared the POLS and the Quantile-Quantile analysis and discovered that a negative interrelationship between natural resource abundance and CO_2 emissions in SSA countries. This insinuates that an abundance of natural resources will enhance the quality of the environment and a U-shaped EKC hypothesis is validated in the region. Examining the connection between natural resource rent and environmental deterioration in China for the duration 1970 to 2016, Ahmed et al., (2020) used the Bayer and Hack co-integration test, and bootstrap causality method to check co-integration and causal interaction among the variables. The outcome of the analysis indicates that there is a long-term interaction between natural resource rent and the EF. It is simply revealed that natural resource rent increases EF. Danish et al., (2020) explored the effect of natural resource rent and other causes which are the real income, renewable energy use, urbanization on the ecological footprint in BRICS countries for the duration of 1992 to 2016. The FMOLS and the DOLS panel estimation methods were used for the study. The study reveals that natural resource rent and ecological footprint granger causes one another. Also, the FMOLS and DOLS indicate that natural resources have a negative influence on the quality of the environment in the BRICS.

2.3. Economic Growth, Urbanization, and Ecological footprint.

Human health and quality of life is vital in any country and this is extensively dependent on the quality of the environment. Hence, several studies have in the last decade assessed environmental consequences of consuming energy amidst other vital energy-related and macroeconomic variables (F. Adedoyin et al., 2020b, 2020a; F. F. Adedoyin et al., 2020c, 2020a, 2020b; Adedoyin and Zakari, 2020; Etokakpan et al., 2020; Kirikkaleli et al., 2020). In respect to this, (Charfeddine, 2017) examined the influence of economic advancement, urbanization, energy use, trade openness, and financial advancement on the environmental deterioration in Qatar. The study considered CO_2 emissions, overall EF and ecological carbon footprint as a stand-in for environmental deterioration. They used the Markov Switching Equilibrium Correction Model from 1970 to 2015. The results indicate proof of co-integration with Markov shifts. It was also confirmed that uncontrolled structural breaks are capable of concealing true relationships amidst the variables. Exploring the impact of economic advancement on carbon dioxide discharge in 31 developing economies, Aye and Edoja (2017) used a dynamic panel technique to discover that economic growth negatively influences CO_2 emissions discharge in the low-growth regime and positively impacts high growth regime. The EKC hypothesis is invalidated in these countries, but a U-shaped interaction. There is a significant causality between CO_2 emissions discharge and economic advancement.

In the case of emerging economies, Danish and wang (2019) studied the connection linking economic advancement and urbanization on EF from 1971 to 2014. The outcome revealed that urbanization escalates EF but controlling the effect of urbanization and economic growth can reduce it, thus improving the quality of the environment. Shi He et al., (2019) explored the interaction between economic indicators and EF in Malaysia over the period 1978 to 2013. The ARDL and causality tests were applied for the study. It was discovered that the EKC hypothesis is not existing in Malaysia. A contradicting interaction exists between urbanization and the EF, while the GDP has a positive influence on it. Majeed and Mazhar (2019) explored the effect of financial advancement on EF. A panel of 131 countries was considered from 1971 to 2017. The study shows that the elements of financial development increase the quality of the environment (reduces environmental degradation). Urbanization was likewise discovered to significantly reduce EF. They also agree that the nature of these relationships may vary based on region. Conclusively, Katircioglu et al., (2018) explored the place of tourism development in the quality of the environment (EF) from 1995 to 2014. Their study focused on the ten most visited countries in the world. The findings are as follows: traditional EKC exists in the ten most visited countries, urban development enhances the quality of the environment in the ten countries, and tourism development is as well favourable to environmental quality.

The trend in the relationships amidst these variables and their effects on ecological footprint appears to be inconsistent across the countries considered in the literature. This is due to differences in income status, regime and policy change, regional locations, and so on. This variability and the importance of securing the environment for future generations necessitate the consideration of each of the countries. These countries represent both the developing and developed economies. Closely related to this study is the study of (Katircioglu et al., 2018), but from a different perspective. This study tests the effect of tourism development and natural resources abundance for environmental quality taking EF as a proxy, in the ten most visited countries, and also studies the direction of interaction amidst the variables. Also, a different and robust methodology from that of (Katircioglu et al., 2018) is adopted for the study.

3. Data, Model, and Methodology

3.1 Data and Model

The study adopted yearly time series data for the ten selected countries that span 1995-2016. The data couldn't have extended beyond 2016; the end date for EF data. Also, the data for tourism development started in 1995. Table 1 gives comprehensive information on, all the variables, their measures, sources, and symbols.

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This study favours the STIRPAT (stochastic impacts by regression on population, affluence, and technology) framework of York et al. (2003). According to the model (STIRPAT), environmental impact(I), is closely knitted to the influence of population (P), affluence(A), and technology (T). The equation of the model is given as:

$$I_t = \mathfrak{C}_o P_t^{\psi 1} A_t^{\psi 2} T_t^{\psi 3} \mu_{it}$$

(1)

The linear form of Eq.(1), following the studies of Lin et al. (2017), is expressed as:

$$lnI_{it} = \mathfrak{C}_o + \psi_1 lnP_{it} + \psi_2 lnA_{it} + \psi_3 lnT_{it} + \mu_{it}$$

(2)

$\psi_1 - \psi_3$ are the parameters. $i, \mathfrak{C}_o, \mu_{it}, and\ t$ represent the cross-sectional units, intercept, error term, and time dimension respectively. In line with Koçak et al. (2020), we capture population with urbanization, affluence with tourism development, while energy intensity served as a proxy for technology. We further expanded the model to accommodate natural resource following the study of Kongbuamai et al. (2020) since the natural resource is a potential variable that can either improve or degrade the quality of the environment depending on how it is being explored and consumed. Therefore, the primary model for this study becomes:

$$lnef_{it} = \mathfrak{C}_o + \psi_1 lnub_{it} + \psi_2 lngr_{it} + \psi_3 lnTD_{it} + \psi_4 lnen_{it} + \psi_5 lnnr_{it} + \mu_{it} \quad (3)$$

Where TD_{it} is tourism development which will be further decomposed into: tourism receipt and tourist arrivals (the two widely used tourism indicators). Studies like Sokhanvar et al. (2018) and Naradda Gamage et al. (2017) used tourism receipts to proxy tourism development, Nepal et al. (2019), Kongbuamai et al. (2020), and Akadiri et al. (2018) used tourist arrivals, while Fahimi et al. (2018) and Koçak et al. (2020) used both. We adopt both variables and incorporates them into Eq. (3) to obtain Eq.(4) and (5) as stated below;

$$lnef_{it} = \mathfrak{C}_1 + \psi_1 lnub_{it} + \psi_2 lngr_{it} + \psi_3 lntr_{it} + \psi_4 lnen_{it} + \psi_5 lnnr_{it} + \mu_{i1t} \quad (4)$$

$$lnef_{it} = \mathfrak{C}_2 + \psi_1 lnub_{it} + \psi_2 lngr_{it} + \psi_3 lnta_{it} + \psi_4 lnen_{it} + \psi_5 lnnr_{it} + \mu_{i2t} \quad (5)$$

Where $ub_{it}, ta_{it,} tr_{it}, en_{it}, nr_{it} and\ gr_{it}$ represent urbanization, tourist arrivals, tourism receipts, energy intensity, natural resource, and economic growth respectively. $\mu_{i1t}\ and\ \mu_{i2t}$, $\mathfrak{C}_1\ and\ \mathfrak{C}_2$, and $\psi_1 - \psi_5$ are the two disturbance terms, constants, and parameters respectively.

3.2 Methodology

3.2.1 Cross-sectional Dependence Test

The first step is to examine the presence of CD so as to avoid biased estimates, meaningless results, and decide on the right estimation approach to adopt (Nathaniel & Iheonu, 2019). We expect CD in our dataset because these countries are signatories to some treaties, like the Paris Agreement of 2015, and as such implement similar environmental policies. The three most used CD tests are the Pesaran CD, Breusch-Pagan LM (BG-LM), and the Pesaran Scaled LM (PSLM) tests. Our attention will, however, be on the last two tests because we are dealing with a dataset were $T > N.$ The CD equation is specified as:

$$CD = \left[\frac{TN(N-1)}{2}\right]^{1/2} \bar{\hat{\rho}}, \quad (6)$$

From Eq. (6), $\bar{\bar{\rho}} = \left[\frac{2}{N(N-1)}\right]\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \widehat{\rho_{ij}}$, where $\widehat{\rho_{ij}}$ is the pair-wise cross-sectional correlation coefficients of residuals. The panel size and time period are respectively $N \; and \; T$.

3.2.2 Panel Unit Root Test

The choice of which unit root test(s) to adopt depends on the outcome of the CD test. If CD exists, then the subsequent analysis will have to be those that accommodate CD. There are majorly two of such unit root tests suggested by Pesaran (2007). They are the cross-sectionally augmented ADF/IPS tests (CADF) and (CIPS). The CADF test equation is stated as:

$$\Delta y_{it} = \Delta\varphi_{it} + \beta_i x_{it-1} + \rho_i T + \sum_{j=1}^{n} \theta_{ij}\, \Delta x_{i,t-j} + \varepsilon_{it} \quad (7)$$

ρ_i is the proxy of the unobservable common factor which Pesaran (2007) introduced to eliminated CD emanating from common shock that might all the units. Also, Pesaran (2007) suggested the following equation to calculate the CIPS:

$$CIPS = \frac{1}{N}\sum_{j=1}^{N} CADF_t$$

(8)

The $CADF_t$ has lots of benefits; it can address serial correlation issues and also accounts for CD.

3.2.3 Cointegration Tests

We applied the Westerlund (2007) test in this study because of its efficiency in dealing with panel data issues. Its equation is given as:

$$\Delta y_{it} = \Psi_i' d_t + \phi_i y_{it-1} + \lambda_i' x_{it-1} + \sum_{j=1}^{pi} \omega_{ij}\, \Delta y_{it-j} + \sum_{j=0}^{pi} \gamma_{ij}\, \Delta x_{it-j} + e_{it}$$

(9)

Where ω, $\Psi_t = (\Psi_{i1}, \Psi_{i2})'$and $d_t = (1, t)'$ are the error correction parameter, vector of parameters, as well as, the deterministic components respectively. The estimation of Eq. 9 will produce four different tests: the panel mean tests, $P_\tau = \frac{\widehat{\alpha_i}}{SE(\widehat{\alpha_i})}$ and $P_\alpha = T\hat{\alpha}$ and the group mean statistics, $G_\tau = \frac{1}{N}\sum_{i=1}^{N}\frac{\widehat{\alpha_i}}{SE(\widehat{\alpha_i})}$ and $G_\alpha = \frac{1}{N}\sum_{i=1}^{N}\frac{T\,\widehat{\alpha_i}}{\widehat{\alpha_i}(1)}$. $SE(\widehat{\alpha_i})$ and $\widehat{\alpha_i}(1)$ are the standard error and the semiparametric kernel estimator of $\widehat{\alpha_i}$ respectively.

3.2.4 Parameter Estimation

Here we apply three techniques (AMG, Driscoll-Kraay (DK), and the panel-corrected standard errors (PCSE) approach) to attain efficiency and compare findings if the need arises. We further apply the FMOLS and DOLS to check for robustness. The estimation of the AMG involves a two-step approach:

AMG - Stage 1: $\Delta y_{it} = \alpha_i + b_i \Delta x_{it} + c_i f_t + \sum_{t=2}^{T} d_t \, \Delta D_t + e_{it}$ (10)

AMG - Stage 2: $\hat{b}_{AMG} = N^{-1} \sum_{i=1}^{N} \hat{b}_i$ (11)

y_{it} and x_{it} are the observables. f_t, b_t, and d_t are unobserved common factor, country-specific estimates of coefficients, and coefficient of the time dummies respectively, with $\hat{b}_{AMG}$ representing the AMG estimator. The AMG, proposed by Bond and Eberhardt (2013), addresses two core panel data issues; heterogeneity and CD (Dogan et al. 2020) ignored by previous studies. The DK, is a non-parametric approach that is very flexible in that it accommodates missing values, addresses heteroscedasticity, serial and spatial dependence, suitable for both small and large sample sizes, balanced and unbalanced panels, and also accounts for CD ((Sarkodie and Strezov 2019). The PCSE approach also share the same advantages with the DK technique.

To ascertain the robustness of the results, the DOLS and FMOLS are applied. In line with recent studies that applied both techniques for robustness (Ulucak et al. 2020; Ouyang et al. 2019; Albulescu et al. 2019; Hashmi and Alam 2019) we specify the DOLS model as:

$$ef_{it} = \mu_i + x_{i,t}\Psi_{i,t} + \sum_{j=-p}^{p} \beta_j \, ef_{i.t-j} + \sum_{j=-q0}^{q0} p_{1.j} \, ub_{i.t-j} + p_{2.j} \sum_{j=-q1}^{q1} gr_{i.t-j} + p_{3.j} \sum_{j=-q2}^{q2} tr_{i.t-j} + p_{4.j} \sum_{j=-q3}^{q3} en_{i.t-j} + p_{5.j} \sum_{j=-q4}^{q4} nr_{i.t-j} + \varepsilon_{i1t} \quad (12)$$

$$ef_{it} = \mu_i + x_{i,t}\Psi_{i,t} + \sum_{j=-p}^{p} \beta_j \, ef_{i.t-j} + \sum_{j=-q0}^{q0} p_{1.j} \, ub_{i.t-j} + p_{2.j} \sum_{j=-q1}^{q1} gr_{i.t-j} + p_{3.j} \sum_{j=-q2}^{q2} ta_{i.t-j} + p_{4.j} \sum_{j=-q3}^{q3} en_{i.t-j} + p_{5.j} \sum_{j=-q4}^{q4} nr_{i.t-j} + \varepsilon_{i1t} \quad (13)$$

p and q are the number of leads and lags of the independent and explained variable respectively. The other variables retain their initial definitions. The FMOLS equation is shown in Eq. (14)

$$ef = \mu_i + x_{i.t}\psi + v_{it}$$
(14)

$$x_{i.t} = x_{i.t} + \mathfrak{C}_{i.t}$$

Where x is a 5*1 vector of explanatory variables, with μ_i as the intercept, while v_{it} and $\mathfrak{C}_{i.t}$ are the disturbance terms. The estimation of ψ is expressed as:

$$\hat{\psi}_{FMOLS} = (\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{i.t} - \bar{x}_{i.t}) * (x_{i.t} - \bar{x}_{i.t})')^{-1} * (\sum_{i=1}^{N} \left(\sum_{t=1}^{T}(x_{i.t} - \bar{x}_{i.t}) * \widehat{EFP}_{it} - T\hat{\Delta}_{v\mathfrak{C}}\right))$$
(15)

3.2.5 Causality Test

Since the parameter estimates in Section 3.2.5 do not show the direction of causality, we thought it worthwhile to apply the Dumitrescu and Hurlin (DH) (2012) test for causality. The DH is a second-generation technique robust for heterogeneity and CD. The DH equation is given as:

$$y_{i,t} = \varsigma_i + \sum_{i=1}^{p}\xi_i^{(p)}y_{i,t-n} + \sum_{i=1}^{p}\pi_i^{(p)}x_{i,t-n} + \mu_{i,t}$$
(16)

The intercept and coefficient ς_i and $\pi_i = \left(\pi_i^{(1)}, \ldots \ldots \pi_i^{(p)}\right)$ are fixed. The autoregressive parameter and regression coefficient are respectively $\xi_i^{(p)}$ *and* $\pi_i^{(p)}$.

4. Results and Discussions

4.1 Pre-estimation Diagnostics

Table 2 reveals the properties of the variables in terms of their standard deviation, maximum and minimum values, and mean. From the findings, economic growth has the highest average while NR has the lowest. More so, NR happens to be the most volatile, closely followed by tourists' arrivals, and then economic growth. In all, urbanization is the least volatile of the variables. Tourist's arrivals and tourism receipt are negatively associated with energy intensity, natural resource, and EF. Urbanization and economic growth have a positive association with

EF, and negatively associated with NR. Furthermore, energy intensity and tourism receipt are negatively correlated with urbanization.

<<< Insert Table 2 Here >>>

The results in Table 3 confirms our initially thoughts of CD. The three tests confirm CD. These countries are signatories to some international organizations, as such, they adhere to recommendations made by these organizations in relation to energy consumption, urban sustainability, and environmental preservation. Therefore, in the vicinity of CD, it is pertinent to adopt estimation approaches that address CD and other panel data issues that could influence the robustness of our results.

<<< Insert Table 3 Here >>>

Table 4 shows the results of the unit root tests for each of the variables. There are lots of panel unit root tests in the literature like the Im et al. (2003), and the Levin et al. (2002) but they don't consider CD and may yield biased outputs. The tests in Table 4 are robust amidst CD and heterogeneity. The results affirmed that the variables are I(1).

<<< Insert Table 4 Here >>>

When variables are I(1) the need to check for cointegration is sacrosanct. Table 5 presents the Westerlund (2007) cointegration results for the two models. In the presence of cointegration, as suggested in Table 5, we then proceed with the long-run parameter estimation.

<<< Insert Table 5 Here >>>

4.2 Estimation

In Table 6 we applied three estimation technique to enable comparison and ensure robustness. Two of the three techniques (PCSE and DK) accounts for CD, while the AMG addresses two core panel data issues; CD and heterogeneity (Dogan et al. 2020). The three results confirm that tourism receipts increase the EF (in Model 1). This is an indication that an increase in tourism activities can reduce environmental quality. These findings follow those of (Ozturk et al. 2016; Ahmad et al. 2019; Mikayilov et al. 2019), but contradicts the findings of Kongbuamai et al. (2020) for ASEAN, and Koçak et al. (2020) and Katircioglu et al. (2018) for top 10 tourist destinations.

The reasons for the discrepancies in the findings are quite clear. For instance, Koçak et al. (2020) proxy environmental quality by CO_2 emissions, while Katircioglu et al. (2018) used a weak estimation technique that ignores CD and other panel data issues. Tourism development can adversely deteriorate the environment through increased energy consumption, especially when they are non-renewable. The increase in resource demand by tourists may lead to deforestation, reduction in biodiversity, and increase in the EF. Tourists are engaged in transportation to ease their movement to and fro destinations. As such, the possibility of polluting the environment through emissions are almost certain. Increase in emissions degrade the environment, hence, a rise in the EF.

<<< Insert Table 6 Here >>>

Just like tourism receipt, natural resource also contributes to environmental degradation. This is possible when there is no sustainable use of resources. The result suggests that the available natural resource cannot serve the purpose of eco-system balance. Most of the countries (especially, China, USA, and Turkey) still generate electricity from coal and fossil fuels; a non-renewable energy source. The consumption demands of tourists are mostly met with agricultural produce. When resources are not allowed to regenerate, the biocapacity declines which results in EF increase. Studies like Ahmed at al. (2020a) and Hassan et al. (2018) discovered the same for China and Pakistan respectively, while Danish et al. (2020) and Zafar et al. (2019) discovered the opposite for BRICS and the United States.

Further findings, (from Model 1), showed that economic growth and energy intensity promote environmental degradation. Of the two, the former exacted the most devastating impact. This is in line with the findings of Ahmed et al. (2020b) for G7 countries. Every country desires growth/development, but the component(s) of growth/development matters for environmental sustainability. This finding corroborates the findings of Nathaniel et al. (2020a), Ahmed et al (2020a), Ahmed et al. (2019), Khan et al. (2020), Danish et al. (2020), and Nathaniel (2020) for MENA, China, Malaysia, Pakistan, BRICS, and Indonesia respectively. Urbanization, on the other hand, promotes environmental quality. This suggests that the urban population in these countries are aware and are also adopting procedures that uphold environmental preservation. This is in consonance with the study of Katircioglu et al. (2018) and Danish et al. (2020).

Model 2 affirms the horrendous impact of economic growth, natural resource, and energy intensity on the EF. Therefore, similar explanations apply. However, tourist arrivals do not increase EF. This finding exposes the fact that the impact of tourism development on the environment depends on the proxy used to measure tourism development, and environmental degradation. For instance, Koçak et al. (2020) discovered that tourist arrivals and urbanization degrade the environment in their study where environmental degradation and tourism development were captured by CO_2 emissions and tourist arrivals respectively. However, Katircioglu et al. (2018) reported the exact opposite when they used EF to proxy environmental degradation. The robustness of our findings is confirmed in Table 7 through the panel (FMOLS and DOLS) results. To avoid overgeneralization, the country-specific FMOLS analysis was carried out. The results in Table 7 (Model 1) reveal lots of interesting outcomes. First of all, economic growth happened to be a major culprit of environmental degradation in all the countries, except in Mexico. Tourism receipt increases the EF in 40% of the countries including China, Italy, Spain, and the UK, while the reverse holds true for France, Germany, Thailand, Turkey, Mexico, and the US. The influence of natural resource on the EF is mixed. Natural resource increases the EF in China, France, Germany, Spain, and the United Kingdom. Ahmed et al. (2020a) had earlier reported the same scenario for China.

<<< Insert Table 7 Here

On the flip side, natural resource promotes environmental quality in the US is consistent with the findings of Zafar et al. (2019). We further discovered that urbanization is not a problem, rather it contributes to environmental wellness. Danish et al. (2020) reported a similar result for China in their analysis of the BRICS countries. However, energy intensity increases EF in all the countries, but the increase was not significant in Mexico.

The situation in Model 2 is almost similar to that in Model 1. For instance, economic growth consistently contributes to environmental degradation in all countries. Unlike the results in Model 1, the natural resource now has a reversed influence on the EF in Germany and the UK. The impact of urbanization is still mixed holding to countries levels of attainment of environmental sustainability. The positive impact of urbanization on the EF had earlier been confirmed by Ahmed et al. (2020a) and Nathaniel et al. (2020b) for China and CIVETS countries respectively. The latter discovered that urbanization increases the EF in Turkey by 0.33%. Analogous to the mixed influence of urbanization, energy intensity adds to the EF in the United States, Thailand, Mexico, and Italy with a reversed influence in Spain, Turkey, Germany, France, China, and the United Kingdom. Interestingly, with tourist arrivals as a proxy for tourism development, consistent results are still observed for China, France, Italy, and Mexico. The intuition here is that tourism development harms the environment in China and Italy. However, in Mexico and France, the development of the tourism sector is still not harmful, at least, for now.

4.3 Dumitrescu and Hurlin Causality

<<< Insert Table 8 Here >>>

Table 8 shows feedback causality between EF and all the studies variables. This suggests that the variables in this study are intrinsically linked. Also, the link between economic growth and natural resource is also well pronounced. This suggests that natural resource can actually drive growth especially when sustainability procedures are inculcated into resource exploration.

This is consistent with the findings of Danish et al. (2020) for BRICS. A bidirectional causality was also witnessed between natural resource and tourism receipt. This finding is appealing; since the development of tourism is associated with more resource exploration and consumption. Finally, we observe no direction of causality between energy intensity and economic growth, and between natural resource and energy intensity.

5. Conclusion and Policy Direction

The study scrutinizes the nexus between tourism development, natural resource abundance and ecological footprint in the top 10 most visited destinations from 1995-2016. We started by checking for CD. The presence of CD necessitated advanced panel approaches that account for CD and other panel data issues. The Westerlund cointegration test was carried out after we discovered that the variables were stationary at $I(1)$, which is the ideal thing to do. In the vicinity of cointegration, we estimated the long-run interaction of the parameters using the AMG, PSCE, and the DK approach. We discovered that tourism receipts, natural resource, economic growth and energy intensity have an increasing effect on EF, while tourism arrivals have a reducing effect on EF. The DOLS and FMOLS results affirmed the robustness of our findings. These findings call for relevant policies to ensure sustainable tourism and resource exploration, energy efficiency and urban sustainability.

Obviously, tourism and natural resource deteriorate the environment in these countries. Slowing down the development of tourism or reducing resource exploration is not the appropriate path to take; rather, policymakers should focus on increasing resource and energy efficiency in the tourism-linked sectors like transportation, logistics, lodging, etc. A viable policy that encourages the use of non-motorized transport could be useful, as against the use of motorized transport which encourages emissions thereby degrading the environment. The consumption of eco-labelled food, products, and renewable energy in the hoteling sector, which is interlinked with the tourism sector, will help abate environmental deterioration emanating from tourism. Resource sustainability could be enhanced through *green exploration* and the utilization of less pollutant energy sources like solar, wide, geothermal, hydropower, nuclear energy, etc. Developmental issues such as household income, infrastructures, and energy poverty drive urbanization. Therefore, an improvement in these factors will enhance rural development and help curb urban anomaly. The introduction of smart cities will be an added advantage. Smart cities will pave the way for innovation, sustainability, and efficient use of energy for transportation, housing, and economic activities.

Data unavailability was an issue in this study. Again, we only considered ten countries. Other determinants of EF were not considered. It would be interesting to see the impact of tourism and institutional quality on the EF for different regions/economic blocs, and on a global scale. Future researchers could leverage on this.

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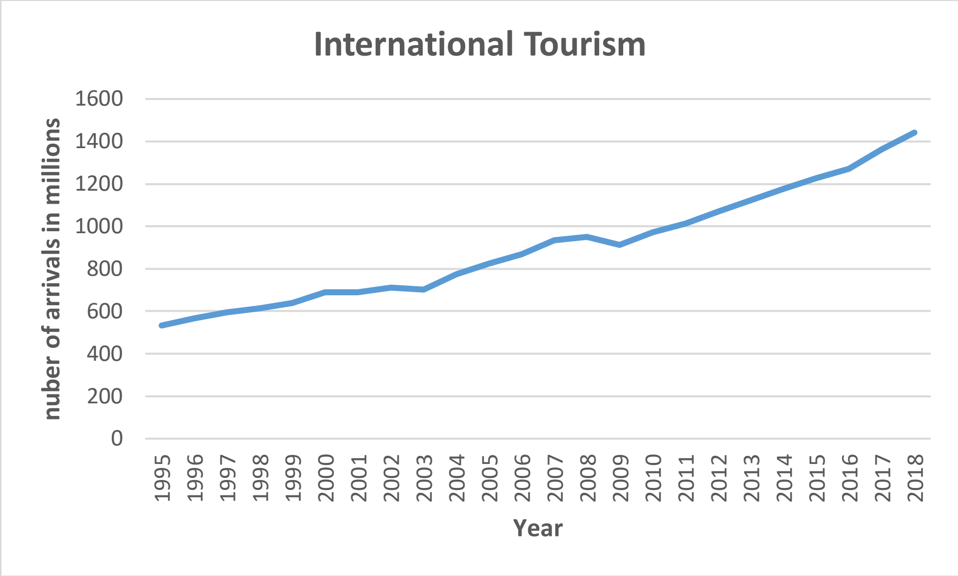
Tables and Figures

Fig. 1. International tourist arrivals between 1995 and 2018.



Data source: World Development Indicator, 2019.

Table 1: Description of Variables

S/N	Variables	Measurement	Source	Symbols
1.	Ecological Footprint	global hectares per capita	GFN (2019)	EF
2.	Natural resource	natural resource rent (% of GDP)	WDI (2019)	NR
3.	Tourists' arrivals	(Number of tourist arrivals)	✓	TA
4.	Energy intensity	(MJ/ $2011 PPP GDP)	✓	EN
5.	Urbanization	% of total population	✓	UB
6.	GDP per capita	in constant 2010 USD	✓	GD
7.	Tourism receipts	% of total export	✓	TR

Sources: Author's compilation.

Table 2: Descriptive Statistics

Statistics	*ln*EF	*ln*NR	*ln*GR	*ln*UB	*ln*EN	*ln*TR	lnTA
Mean	1.445	-0.902	9.790	4.195	1.559	2.088	16.84
Std. D.	0.439	1.641	0.999	0.271	0.319	0.570	1.323
Minimum	0.609	-3.663	7.110	3.410	1.080	0.581	11.42
Maximum	2.349	2.293	10.86	4.417	2.655	3.079	18.25
Correlation							
*ln*EF	1						
*ln*NR	-0.394	1					
*ln*GR	0.445	-0.583	1				
*ln*UB	0.412	-0.339	0.428	1			
*ln*EN	-0.002	0.391	-0.280	-0.504	1		
*ln*TR	-0.058	-0.370	-0.160	-0.060	-0.193	1	
lnTA	-0.144	-0.130	0.135	0.151	-0.168	-0.008	1

Source: Authors' Computations

Table 3: Cross-sectional Dependence Test

Variables	*Breusch-Pagan LM*	*Pesaran scaled LM*	*Pesaran CD*
EF (log)	433.0815[a]	40.90738[a]	2.978073[a]
NR (log)	385.0669[a]	35.84649[a]	17.48525[a]
GR (log)	644.9923[a]	63.24474[a]	23.76407[a]
UB (log)	951.0815[a]	95.50938[a]	30.83357[a]
EN (log)	842.3715[a]	84.05033[a]	28.91902[a]
TR (log)	331.9596[a]	30.24820[a]	10.54140[a]
TA (log)	708.6244[a]	69.95216[a]	26.46672[a]

Note: [a] implies statistical significance at the 1% level

Source: Author's computation.

Table 4: Panel Unit Root Tests

Variables	*Level*		*First Difference*	
	CIPS	***CADF***	***CIPS***	***CADF***
EF (log)	-0.984	10.01	-4.482[a]	15.92[b]
NR (log)	-2.139	10.22	-4.592[a]	16.12[a]
GR (log)	-2.122	12.32	-2.165[a]	13.16[a]
UB (log)	-0.611	11.51	-1.741[a]	12.33[b]
EN (log)	-2.311	11.22	-4.566[a]	15.61[a]
TR (log)	-1.982	10.23	-4.201[a]	13.55[b]
TA (log)	-1.306	14.32	-3.867[a]	17.26[b]

Source: Authors' Computation. Note: [a] and [b] imply statistical significance at the 1% and 5% levels respectively.

Table 5: Westerlund Cointegration Test

Statistic	*Value*	*Z-value*	*Robust P-value*
MODEL1			
Gt	-4.325[a]	-4.499	0.000
Ga	-0.344	6.493	1.000
Pt	-14.635[a]	-5.850	0.000
Pa	-0.378	5.364	1.000
MODEL2			
Gt	-2.792[b]	-1.843	0.033
Ga	-3.566	3.360	1.000
Pt	-7.736[c]	-1.462	0.072
Pa	-3.086	1.967	0.975

Source: Author's computation. Note: [a], [b], and [c] show significance at 1%, 5% and 10% levels respectively.

Table 6: AMG, PCSE, and DRISTOL/KRAAY Results.

Variables	*AMG*	*PCSE (AR(1))*	*DRISTOL/KRAAY*
MODEL 1			
NR (log)	0.004 (4.93)[a]	0.042 (11.20)[a]	0.042 (8.87)[a]
GR (log)	1.164 (6.83)[a]	0.528 (41.04)[a]	0.528 (30.09)[a]
UB (log)	-3.185 (-5.01)[a]	-0.001 (-0.04)	-0.001 (-0.02)
EN (log)	0.510 (4.53)[a]	0.555 (28.13)[a]	0.555 (16.56)[a]
TR (log)	0.007 (3.45)[a]	0.092 (6.28)[a]	0.092 (4.14)[a]
MODEL 2			
NR (log)	2.760 (1.47)	0.002 (0.53)	0.002 (0.60)
GR (log)	0.477 (2.30)[a]	0.451 (39.50)[a]	0.451 (41.54)[a]
UB (log)	4.090 (1.83)[c]	0.059 (1.79)[c]	0.059 (1.31)
EN (log)	1.790 (1.88)[c]	0.459 (24.85)[a]	0.459 (13.42)[a]
TA (log)	-0.548 (-2.55)[b]	-3.086 (-21.25)[a]	-3.086 (-17.9)[a]
Number of Regressors	5	5	5
Number of Observations	210	210	210
Number of Groups	10	10	10
R-squared	-	0.9511	0.9511

Source: Author's computation. Note: [a] , [b] and [c] show significance at 1%, 5%, and 10% levels respectively. ( ) are the t-stat. PCSE stands for Panel Corrected Standard Errors.

Table 7: Country-wise Results

Model 1:						**FMOLS**						
	PANEL	**PANEL**	China	France	Germany	Italy	Mexico	Spain	Thailand	Turkey	UK	USA
	FMOLS	**DOLS**	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF
***ln*NR**	0.00 ^{a}	0.09^{a}	0.01^{a}	0.01	0.02^{b}	-0.03^{a}	-0.01	0.03	-0.00	-0.01^{b}	0.07^{a}	-0.01^{a}
	(7.38)	(7.76)	(12.9)	(1.06)	(2.88)	(-4.74)	(-0.91)	(1.22)	(-0.35)	(-2.90)	(46.0)	(-5.96)
***ln*GR**	1.13 ^{a}	0.89^{a}	0.88^{a}	1.38^{a}	0.44^{a}	1.42^{a}	-0.31^{b}	1.50^{a}	1.60^{a}	0.94^{a}	1.62^{a}	1.87 ^{a}
	(114.7)	(13.1)	(98.5)	(29.6)	(3.83)	(23.4)	(-2.08)	(26.4)	(19.6)	(21.9)	(84.6)	(57.0)
***ln*UB**	-3.38^{a}	-0.96^{a}	-0.35^{a}	-4.75^{a}	-2.96^{a}	-0.03^{a}	-3.88^{a}	-6.08^{a}	-1.30^{a}	-1.18^{a}	-4.21^{a}	-7.86 ^{a}
	(-35.4)	(-3.21)	(-12.2)	(-15.2)	(-5.58)	(-4.74)	(-10.4)	(-6.20)	-13.2	(-7.97)	(-21.2)	(-17.8)
***ln*EN**	0.48^{a}	0.17^{a}	0.74^{a}	0.32^{a}	0.41^{a}	0.48^{a}	0.05	0.43^{a}	0.35^{a}	0.58^{a}	0.55^{a}	0.93^{a}
	(47.8)	(11.6)	(70.5)	(5.53)	(4.59)	(5.57)	(0.41)	(3.48)	(3.23)	(14.9)	(22.2)	(20.7)
***ln*TR**	0.01^{b}	0.24^{a}	0.03^{a}	-0.15^{a}	-0.11^{b}	0.09^{b}	-0.28^{a}	0.64^{a}	-0.16^{b}	-0.01	0.16^{a}	-0.11 ^{b}
	(2.08)	(4.85)	(12.7)	(-10.8)	(-2.10)	(2.12)	(-11.3)	(4.60)	(-5.41)	(-0.54)	(26.0)	(-8.74)

Model 2:						**FMOLS**						
	PANEL	**PANEL**	China	France	Germany	Italy	Mexico	Spain	Thailand	Turkey	UK	USA
	FMOLS	**DOLS**	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF	*ln*EF
***ln*NR**	0.01	0.00	0.20^{a}	0.29^{b}	-0.21^{a}	2.43 ^{a}	0.50^{a}	0.70^{a}	0.83^{a}	0.71	-0.10^{a}	0.11^{b}
	(1.63)	(1.19)	(5.01)	(2.88)	(-5.95)	(4.18)	(4.70)	(12.0)	(6.87)	(6.62)	(-4.64)	(2.06)
***ln*GR**	1.19^{a}	1.22^{a}	0.33^{a}	1.97^{a}	0.55^{a}	0.83^{a}	0.01^{a}	0.97 ^{a}	0.35^{a}	0.47	0.14^{a}	0.42 ^{a}
	(14.6)	(13.2)	(3.91)	(4.06)	(4.88)	(18.3)	(8.01)	(5.87)	(13.8)	(2.02)	(5.04)	(7.19)
***ln*UB**	0.60	0.17	0.21 ^{a}	0.01^{a}	-4.25	-0.11	-0.22^{a}	0.02	0.56^{a}	0.09	-0.35^{a}	-0.16^{a}
	(0.11)	(0.02)	(4.43)	(6.51)	(-0.88)	(-1.22)	(-5.32)	(-0.68)	(7.02)	(9.74)	(-7.08)	(-3.61)
***ln*EN**	0.00^{b}	0.00 ^{a}	-0.21^{a}	-0.77^{b}	-0.86^{a}	0.67^{b}	1.09^{b}	-0.80 ^{a}	0.19^{a}	-0.03	-4.18^{a}	0.15^{a}
	(2.21)	(3.63)	(-4.11)	(-2.71)	(-3.45)	(2.09)	(2.06)	(-7.63)	(8.67)	(0.88)	(-2.07)	(3.25)
***ln*TA**	-0.08^{b}	-0.08^{c}	0.01^{a}	-0.05^{a}	0.06^{a}	0.61^{a}	-0.06^{a}	-0.12 ^{a}	0.65^{a}	0.08	-0.06^{c}	0.10^{a}
	(-2.60)	(-1.93)	(12.1)	(9.84)	(33.0)	(3.96)	(6.21)	(-4.71)	(7.28)	(4.18)	(-1.88)	(2.99)

Source: Authors Computation. t statistics in parentheses; ="^{c}p<0.10, ^{b}p<0.05, ^{a}p<0.001"

Table 8: D-H Causality Test

Null Hypothesis	***W-stat.***	***Zbar-stat.***	***Probability***	***Decision***
*ln*EF → *ln*TR *ln*TR→ *ln*EF	7.344 4.893	8.448 4.574	0.000 0.000	Yes
*Ln*EF →*ln*TA *ln*TA→ *ln*EF	7.518 3.790	8.726 2.831	0.000 0.004	Yes
*ln*EF → *ln*NR *ln*NR → *ln*EF	4.533 3.703	4.005 2.694	0.000 0.007	Yes
*ln*EF → *ln*GR *ln*GR → *ln*EF	6.893 3.917	7.737 3.031	0.000 0.002	Yes
*ln*EF→ *ln*UB *ln*UB → *ln*EF	8.393 4.899	10.10 4.584	0.000 0.000	Yes
*ln*GR → *ln*NR *ln*NR → *ln*GR	4.134 4.360	3.375 3.732	0.000 0.000	Yes
*ln*NR → *ln*TR *ln*TR → *ln*NR	6.083 3.427	6.457 2.257	0.000 0.024	Yes
lnUB→ *ln*GR *lnGR*→ *lnUB*	4.381 8.962	3.765 11.00	0.000 0.000	Yes
lnEN→ *lnGR* *lnGR*→ *lnEN*	1.319 1.987	0.331 1.519	0.740 0.128	No
lnEN→ *lnNR* *lnNR*→ *lnEN*	1.609 0.708	0.847 -0.756	0.397 0.449	No

Source: Author's computation.