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The Nexus Between Tourism, Environmental Degradation and Economic Growth

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ABSTRACT

This study analyzes the impact of tourism on environmental degradation for 32 OECD countries employing panel estimation techniques taking into consideration cross-sectional dependence. The test results demonstrate that tourism and economic growth enhance CO2 emissions in these countries. The Emirmahmutoglu-Kose panel Granger causality test show that unidirectional association running from tourism to CO2 emissions exists in OECD countries. For individual countries, bidirectional association between tourism and CO2 emissions for Canada, a unidirectional association from tourism to CO2 emissions for Chile, Germany, Ireland, Latvia, and United States exists. Bidirectional relationship is also confirmed between tourist arrivals and GDP for Austria, Germany, and Slovak Republic. Moreover, unidirectional causality is found from tourist arrivals to GDP for Colombia, Latvia, Netherlands, Poland, and Spain.

Keywords: Tourism, CO2 emissions, OECD countries, Cross-sectional dependence, Emirmahmutoglu-Kose panel Granger causality test

JEL codes: C23, O13, O44, Z32

INTRODUCTION

The nexus between tourism and CO2 emissions has drawn much research interest recently due to an increasing trend in CO2 emissions which have been witnessed in the world. Lenzen et al. (2018) estimated the contribution of international tourism account for 8% of global greenhouse gas emissions. Besides, international tourism may contribute to CO2 emissions by variety of factors such as tourist activities (Becken and Simmons, 2002; Becken and Patterson, 2006) air travel (Gössling, 2000; Olsthoorn, 2001; Gössling, 2002; Gössling et al. 2002; Gössling et al., 2005; Kuo and Chen, 2009), infrastructure facilities, such as hotels, roads, airports and other tourist establishments (Katircioglu 2014a; Katircioglu et al., 2018). Pang et al. (2013) argue that while tourism may be affected due to the climate changes, at the same time, tourism sector contributes to CO2 emissions. Scott (2011) emphasizes that it is crucial for the sustainability of tourism, the response of tourism to climate change. Besides, Fang et al. (2018) conclude that the examination of the nexus between climate change and tourism has been rapidly increased between 1990 and 2015 analyzing 976 academic papers indicating the importance of tourism on environmental degradation.

International tourism affect economy through different channels, such as creating job opportunities, increasing income levels, and foreign exchange reserves (Balaguer and Cantavella-Jorda, 2002; Dritsakis, 2004; Zhang and Gao, 2016; Alam and Paramati, 2016; Paramati et al., 2017a; Shahzad et al. 2017). According to the report of Travel Tourism Economic Impact (2019) published by World Travel and Tourism Council in 2019, the tourism sector's direct and total contributions to World's GDP in 2018 were 3.2% and 10% of total GDP in the world, respectively. The report also indicated that sector generated about 122.8 million jobs (3.8% of total employment) directly and 318.8 million jobs (10% of total employment) indirectly.

As aforementioned above, it is important to examine the dynamic relationship between tourism, CO2 emissions, and economic growth in a combined approach to implement policies aiming at higher economic

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growth and number of tourist arrivals without harming environment. The primary purpose of this paper is to examine the relationships among tourism, CO2 emissions, and economic growth utilizing Common Correlated Effects Mean Group (CCE-MG) developed by Pesaran (2006) and Augmented Mean Group (AMG) estimator proposed by Eberhardt and Teal (2010). This study further employs Emirmahmutoglu-Kose (2011) panel Granger causality test to find the direction of causality between tourism, CO2 emissions, and economic growth for OECD countries.

LITERATURE REVIEW

Numerous studies have examined the effect of tourism activities on CO2 emissions with different contexts. Becken (2013) provides compressive reviews on the relationship between tourism and climate change. The literature review section discusses the nexus between tourism, CO2 emissions and economic growth.

Tourism and economic growth

There is mounting mass of literature estimating the nexus between tourism and economic growth in a multivariate framework focusing on a single country or group of countries utilizing various econometric analysis. However, the results of the studies are ambiguous due to the sample of countries, time period, used methodology, selected variables and the data. Besides, comprehensive surveys provide valuable insights on this issue utilizing meta-analysis (Nunkoo et al., 2020; Fonseca and Sánchez Rivero, 2019; Qin et al., 2018; Seetanah et al, 2017; Castro-Nuño et al., 2013). For instance, Fonseca and Sánchez Rivero (2019) employ a meta-analysis on a dataset of 55 studies employing Granger causality test concluding that the tourism-led growth hypothesis is inclined to be confirmed more populated countries and countries which is more specialized in tourism activities. Seetanah et al. (2017) and Nunkoo et al. (2020) emphasize that data, econometric methodology used in the paper affects the results of the studies. Castro-Nuño et al. (2013) conclude that tourism activities contribute to economic growth. Lee and Brahmasrene (2016) conclude that economic growth is positively affected by tourism in Sub-Saharan African countries. For four Pacific Island countries, Narayan et al. (2010) found that a rise in tourism contributes to a rise in economic growth.

The causal relationship between tourism and economic growth has been synthesized into four hypotheses. First hypothesis called tourism-led growth hypothesis asserts that tourism contributes to economic growth positively. A unidirectional causal relationship running from tourism to economic growth was found by many studies of Gunduz and Hatemi-J (2005) for Turkey; Tang et al. (2016) for India; and Tang and Abosedra (2016) for Lebanon; Tang and Tan (2015) for Malaysia; Wu and Wu (2019) for Cambodia, China, and Malaysia. Qureshi et al. (2017) confirm the TLG hypothesis for 37 tourism- induced countries. Isik et al. (2017) confirmed TLG hypothesis for China, and Turkey. Again, similar result obtained for China, Turkey, and for the top seven most visited destinations by Isik et al. (2018). Tang and Abosedra (2014) support the TLG hypothesis in the MENA region. Shahzad et al. (2017) confirm TLG hypothesis for top ten tourism countries. Balli et al. (2019) for Egypt, Italy, and Spain.

Second, economic-driven tourism hypothesis indicates that economic growth leads to an increase in tourism. The second hypothesis confirmed by Isik et al. (2018) for Spain; Oh (2005) for South Korea.

Third hypothesis considers that bidirectional causality exists between tourism and economic growth. Such bidirectional causal relationship confirmed in many countries. For instance, Demiroz and Ongan (2005) and Balli et al. (2019) for Turkey; Cortes-Jimenez and Pulina (2010) and Perles-Ribes et al. (2017) for Spain; Lean and Tang (2010) for Malaysia; Isik et al. (2018) for Germany; Ben Jebli Hadhri (2018) for a sample of top ten tourism countries; Aslan (2014) for Portugal; Dogru and Bulut (2018) for seven Mediterranean countries; Mitra (2019) for 158 countries, dividing into three sub-groups according to the ratio of international tourism receipts to GDP. Akadiri and Akadiri (2019) for 16 selected tourism island countries, Akadiri et al. (2020a) for Germany.

Fourth hypothesis indicates that no causal relationship between tourism and economic growth exists. The fourth hypothesis confirmed by Katircioglu (2009) for Turkey; Isik et al. (2018) for France, Italy, and the US; Aslan (2014) for Malta and Egypt; Wu and Wu (2019) for Japan and Thailand.

Tourism and CO2 Emissions

Most studies found a positive impact of tourism on climate change. Dogru et al. (2019) provide evidence of the presence of the vulnerability of tourism sector to climate changes. León et al. (2014) reveal that tourism leads to an increase in CO2 emissions in the different stage of developed countries. Zaman et al. (2016) point out that tourism expansion contributes the environmental deterioration for 34 countries. Dogan (2017)

found positive correlation between tourism and CO2 emissions for top ten most visited destinations.

Paramati et al. (2017a) argue that the tourism affects CO2 emissions positively, but magnitude differs across developing and developed countries. Paramati et al. (2017b) demonstrated that tourism activities surge CO_2 emissions in Eastern EU, while decrease in Western EU. Gulistan et al. (2020) find that tourism negatively affects environment via increasing CO2 emissions for 112 countries.

In contrast, Lee and Brahmasrene (2013) found that tourism negatively correlated with CO2 emissions in the EU countries. Brahmasrene and Lee (2017) find that tourism activities reduce CO2 emissions in the ten Southeast Asian countries. Azam et al. (2018) found that while there is negative association between tourism and environmental pollution for Singapore and Thailand, a positive association found for Malaysia.

Regarding Turkey, Katircioglu (2014a) and Eyuboglu and Uzar (2019) found positive correlation between tourism and CO2 emissions. Similar finding is obtained for Cyprus by Katircioglu et al. (2014).

Saint Akadiri et al. (2019) point out that tourism gives rise to CO2 emissions in Turkey. Unidirectional causal association found from tourism to CO2 emissions by many scholars both for a group of counties or in a country level. Dogan and Aslan, 2017; Dogan et al., 2017 for OECD countries; Sharif et al., 2017 for Pakistan; Solarin, 2014 for Malaysia; Yorucu, 2016 for Turkey; Raza et al., 2017 for the United States. Alola et al. (2019) confirm bidirectional association between tourist arrivals and CO2 emissions for nine Coastline Mediterranean Countries. Katircioglu et al. (2019) found that tourism growth was positively associated with energy consumption in major tourism countries, suggesting that countries need to invest more renewable energy usage sources for no harm to the environment. Shi et al. (2019) found that net international arrivals positively affect CO2 emissions. Kadir et al. (2019) argued that tourism was positively correlated with CO2 emissions for 30 selected countries. Akadiri et al. (2020b) found that unidirectional causal association between tourism and CO2 emissions exists for 16 island developing economies. Eluwole et al. (2020) conclude that tourism contributes to environmental deterioration for 37 developed countries. Katircioglu et al. (2020) pointed out that tourism results in CO2 emissions in Cyprus.

Apart from that, some other studies also examined whether the tourism-induced EKC hypothesis is valid for countries. Katircioglu (2014b) posits that tourism contributes to environmental degradation in establishing the tourism-induced EKC in Singapore. For Turkey, De Vita et al. (2015) provide evidence for the presence the tourism-induced EKC. For Asia-Pacific countries, Shakouri (2017) provide evidence of the validity of tourism-induced EKC hypothesis. On the other hand, Zhang and Gao (2016) provide no evidence to presence of tourism induced EKC for China.

DATA, METHODOLOGY and MODEL

The objective of this paper is to examine the relationship between tourism, CO2 emissions, and economic growth for selected OECD countries, namely Australia, Austria, Belgium, Canada, Chile, Colombia, Czech Republic, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Korea, Rep., Latvia, Lithuania, Luxembourg, Mexico, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Turkey, United Kingdom, and United States. The dataset for the countries covers the period from 1995 to 2014 and extracted from World Bank. The final period as 2014 was determined by the availability of the data for CO2 emissions variable. We used CO2 emissions as the measurement for environmental degradation.

Several study such as Gunduz and Hatemi-J, 2005; Katircioglu et al., 2014; Dogan and Aslan, 2017 used tourist arrivals to measure tourism activities. In the present study, CO2 emissions is used as an environmental degradation variable. Following Tang et al. (2014), and Lee and Brahmasrene (2013) the model is expressed as follows:

$$CO_{2t} = f(TOU_{it}, GDP_{it})$$

where TOU_{it} is number of tourist arrivals, CO_{2it} denotes CO2 emissions, and GDP_{it} denotes GDP per capita at 2010 prices.

Cross-sectional dependence and homogeneity tests determine the appropriate econometric methodology in the analysis. Hence, this paper utilized cross-sectional independence test proposed by Pesaran (2004), and homogeneity test developed by Pesaran-Yamagata (2008). After cross-sectional independence and homogeneity test, we investigate the time series properties of the variables utilizing CIPS unit roots developed by Pesaran (2007) that takes into account cross-sectional dependence. Then, according to the data characteristics of the used variables in the study, we employ common correlated effect (CCE) estimator taking into account

the cross-sectional dependence developed by Pesaran (2006) and Augmented Mean Group (AMG) estimator proposed by Eberhardt and Teal (2010). Finally, in order to determine the direction of causal relationship between tourism, CO2 emissions and economic growth, we used Emirmahmutoglu-Kose (2011) Granger panel causality test.

EMPIRICAL RESULTS

Before investigating the linkages among tourism, CO2 emissions and economic growth, first, we analyze cross-sectional dependence test proposed by Pesaran (2004) between variables and homogeneity test developed by Pesaran-Yamagata (2008) across OECD countries, and the results are illustrated in Table 1 and Table 2.

Table 1: Cross-sectional dependence test results

lnCO2	20.86*
lnTOU	65.32*
lnGDP	85.74*

* refers to a significance level of 1%.

According to the results there exists cross-sectional dependence, implying that a shock occurred in one OECD countries may spill over to other countries.

Table 2: Delta Homogeneity Test Results

$\widetilde{\Delta}$	2.729*
$\widetilde{\Delta}\text{adj}$	3.212*

* refers to a significance level of 1%.

Table 2 reports Delta homogeneity test results. According to the results, we reject the null hypothesis of slope homogeneity, confirming cross-country heterogeneity for OECD countries.

Table 3: The Results of CIPS Unit Root Test

lnCO2	-1.746
lnTOU	-2.196
lnGDP	-1.296
ΔlnCO2	-4.142 *
ΔlnTOU	-3.819 *
ΔlnGDP	-2.802 *

* refers to a significance level of 1%.

Table 3 presents CIPS unit root test results developed by Pesaran (2007). The results reveal that we fail to reject the null hypothesis of unit root at level, however, we reject the null at first difference.

Table 4: Panel Cointegration Test Results

Durbin-H Group	18.049 *

* refers to a significance level of 1%.

According to the Westerlund–Durbin–Hausman (2008) panel cointegration test results tourist arrivals, CO2 emissions and economic growth are cointegrated.

Table 5: Individual CCE-MG Test Results

Country	Dependent variable: CO2 emissions	
	lnTOU	lnGDP
Australia	-0.31	0.35
Austria	0.49***	-1.11
Belgium	0.29	1.77
Canada	0.34**	0.35
Chile	0.21	0.56
Colombia	-0.04	1.40*
Czech Republic	0.18**	-0.22
Finland	0.20	-2.69**
France	-0.01	0.98
Germany	-0.12	0.77*
Greece	0.08	0.41**
Iceland	0.42**	0.75
Ireland	0.32	0.65*
Israel	-0.04	2.28*
Italy	-0.27*	1.54*
Japan	-0.05	2.49*
Korea, Rep.	0.23	1.13*
Latvia	0.52*	-0.51
Lithuania	-0.10	1.06*
Luxembourg	-0.01	-0.64
Mexico	-0.20**	0.22
Netherlands	-0.02	-0.58***
Norway	0.31	1.51
Poland	-0.18	0.85*
Portugal	0.24	2.12***
Slovak Republic	0.14**	0.25**
Slovenia	0.12	1.36*
Spain	0.33	2.37*
Sweden	0.04	2.22**
Turkey	-0.01	1.18*
United Kingdom	-0.13	0.72**
United States	0.05	1.38*
Panel	0.08**	0.78*

The results of CCE-MG estimation are presented in Table 5. CCE-MG test results show that an increase in tourist arrivals lead to an increase in CO2 emissions in Austria, Canada, Czech Republic, Iceland, Latvia, Mexico, and Slovak Republic. Besides, an increase in GDP results in an increase in CO2 emissions most OECD countries.

Table 6: Individual AMG Test Results

Country	Dependent variable: CO2 emissions	
	lnTOU	lnGDP
Australia	-0.33**	1.26*
Austria	0.48	1.43*
Belgium	0.30	0.11
Canada	0.37*	0.65*
Chile	0.21	0.56
Colombia	-0.10**	1.99*
Czech Republic	-0.13	0.46*
Finland	0.07	0.86*
France	-0.01	1.02*
Germany	-0.01	0.38
Greece	0.11	0.67*
Iceland	0.39**	0.27**
Ireland	-0.13	0.77*
Israel	-0.07***	2.02*
Italy	-0.28*	1.75*
Japan	-0.05	1.27*
Korea, Rep.	0.49*	0.54
Latvia	0.62*	-0.70*
Lithuania	-0.15	0.36***
Luxembourg	-0.39	1.16*
Mexico	-0.26	0.82*
Netherlands	-0.09***	0.13
Norway	0.10	1.23
Poland	0.26**	0.53**
Portugal	0.20	1.68*
Slovak Republic	0.09**	0.17**
Slovenia	0.04	0.66*
Spain	0.49**	1.12*
Sweden	0.11	0.10
Turkey	0.04	0.64*
United Kingdom	-0.01	0.67*
United States	0.01	0.74*
Panel	0.07***	0.79*

AMG test results are illustrated in Table 6. The results reveal that a rise in tourism increases environmental deterioration in Australia, Canada, Colombia, Iceland, Israel, Italy, Latvia, Netherlands, Poland, Slovakia, and Spain. Similar to the panel CCE-MG test results, panel AMG results show that GDP was positively correlated with CO2 emissions in most OECD countries. The surge in GDP results in increase in CO2 emissions in most OECD countries.

In addition, panel CCE-MG and panel AMG estimators reveal that the CO2 are positively affected by tourism and economic growth. The panel CCE-MG estimation results exhibit that an 1% increase in tourism contributes to CO emissions by 0.08%. Moreover, a 1% increase in GDP leads to a rise in CO2 emissions by 0.78% in a panel of OECD countries.

Finally, causality between TOU and CO2; TOU and GDP, GDP and CO2 was tested by Emirmahmutoglu-Kose (2011) panel Granger causality test.

Table 7 shows Emirmahmutoglu-Kose panel Granger causality test results between TOU and CO2 emissions for 32 OECD countries. The results show that unidirectional association from TOU to CO2 emissions in OECD countries exists. For individual countries, bidirectional association between TOU and CO2 emissions for Canada is found. The results also show that a unidirectional association from TOU to CO2 emissions for Chile, Germany, Ireland, Latvia, and United States exists.

Table 7: Emirmahmutoglu-Kose Granger panel causality test results

Country		TOU => CO2			CO2 => TOU	
	Lag	Wald Statistic	p-value	Lag	Wald Statistic	p-value
Australia	1	1.255	0.263	1	1.875	0.171
Austria	1	0.129	0.719	1	3.033	0.082***
Belgium	2	0.952	0.621	2	17.479	0.000*
Canada	1	5.711	0.017**	1	6.054	0.014**
Chile	2	10.945	0.004*	2	10.676	0.005*
Colombia	2	2.215	0.330	2	3.155	0.207
Czech Republic	1	0.744	0.388	1	2.380	0.123
Finland	1	0.125	0.724	1	3.389	0.066***
France	4	0.967	0.617	2	0.594	0.743
Germany	1	3.876	0.049**	1	0.390	0.532
Greece	2	0.568	0.753	3	6.589	0.086***
Iceland	3	1.274	0.735	1	0.035	0.851
Ireland	3	8.088	0.044**	1	0.024	0.876
Israel	1	1.604	0.205	1	1.766	0.184
Italy	1	0.768	0.381	2	12.373	0.002*
Japan	3	1.561	0.668	1	0.000	0.998
Korea, Rep.	1	0.214	0.644	1	0.266	0.606
Latvia	2	6.654	0.036**	1	0.082	0.775
Lithuania	1	0.633	0.426	1	0.723	0.395
Luxembourg	2	0.135	0.935	2	2.080	0.353
Mexico	1	0.470	0.493	1	0.191	0.662
Netherlands	3	4.075	0.253	2	9.843	0.007*
Norway	1	1.467	0.226	1	0.164	0.685
Poland	3	2.087	0.554	1	0.012	0.912
Portugal	2	1.014	0.602	1	0.188	0.664
Slovak Republic	1	0.343	0.558	1	0.733	0.392
Slovenia	1	1.007	0.316	2	0.886	0.347
Spain	1	0.000	0.993	1	0.868	0.648
Sweden	1	0.754	0.385	1	2.206	0.137
Turkey	2	1.351	0.509	1	0.470	0.493
United Kingdom	3	0.179	0.981	2	0.152	0.927
United States	1	8.192	0.004*	1	0.139	0.709
Panel Fisher		84.897			110.119 **	

Table 8 exhibits Emirmahmutoglu-Kose panel Granger causality test results between TOU and GDP for 32 OECD countries. The results show that bidirectional relationship between tourist arrivals and GDP for Austria, Germany, and Slovak Republic exists, confirming the feedback hypothesis. Unidirectional causality is confirmed from tourist arrivals to GDP for Colombia, Latvia, Netherlands, Poland, and Spain.

Table 8: Emirmahmutoglu-Kose panel Granger causality test results

Country	Lag	TOU=> GDP		Lag	GDP => TOU	
		Wald Statistic	p-value		Wald Statistic	p-value
Australia	2	1.792	0.408	2	1.759	0.415
Austria	1	5.426	0.020**	1	4.139	0.042**
Belgium	1	0.325	0.569	1	0.421	0.516
Canada	1	0.213	0.644	1	0.103	0.748
Chile	1	3.457	0.063***	1	0.437	0.509
Colombia	1	6.869	0.009*	1	0.023	0.879
Czech Republic	1	0.052	0.820	1	0.004	0.951
Finland	1	0.378	0.539	1	0.002	0.962
France	1	0.055	0.814	1	0.700	0.403
Germany	1	3.240	0.072***	1	5.837	0.016**
Greece	2	3.810	0.149	1	3.428	0.180
Iceland	1	0.063	0.802	2	1.072	0.300
Ireland	1	0.302	0.582	1	0.373	0.541
Israel	1	0.923	0.337	1	4.241	0.039**
Italy	1	0.173	0.678	1	0.046	0.830
Japan	1	0.419	0.517	1	0.235	0.628
Korea, Rep.	1	1.266	0.261	1	0.000	0.992
Latvia	3	7.838	0.049**	3	0.365	0.947
Lithuania	1	1.819	0.177	1	0.131	0.718
Luxembourg	1	0.053	0.818	1	1.148	0.284
Mexico	1	0.309	0.578	1	0.075	0.785
Netherlands	2	5.022	0.081***	2	2.121	0.346
Norway	1	0.216	0.642	1	0.307	0.579
Poland	2	4.883	0.087***	2	0.056	0.972
Portugal	1	2.522	0.112	1	0.104	0.748
Slovak Republic	3	8.535	0.036**	3	6.254	0.100***
Slovenia	1	0.195	0.658	1	1.197	0.274
Spain	3	8.891	0.031**	3	0.694	0.874
Sweden	1	0.432	0.511	1	0.706	0.401
Turkey	1	0.010	0.922	1	1.476	0.224
United Kingdom	1	0.084	0.772	1	1.205	0.272
United States	2	0.747	0.688	2	1.109	0.574
Panel Fisher		89.587			60.387	

Table 9 reports Emirmahmutoglu-Kose panel Granger causality test results between GDP and CO2 for OECD countries. The test results provide evidence of bidirectional causal association between GDP and CO2 emissions Slovenia, and unidirectional causal association from GDP to CO2 emissions for Israel, South Korea, Netherlands, Poland and United States. Moreover, unidirectional causal association is confirmed running from CO2 emission to GDP for Austria, Belgium, Canada, Finland, and Luxembourg.

Table 9: Emirmahmutoglu-Kose panel Granger causality test results

Country	Lag	GDP=> CO2		Lag	CO2 => GDP	
		Wald Statistic	p-value		Wald Statistic	p-value
Australia	1	0.331	0.565	1	1.875	0.171
Austria	1	0.013	0.911	1	3.033	0.082***
Belgium	2	0.104	0.747	2	17.479	0.000*
Canada	1	0.025	0.873	1	6.054	0.014**
Chile	1	0.065	0.798	2	10.676	0.005*
Colombia	1	1.386	0.798	2	3.155	0.207
Czech Republic	1	0.351	0.553	1	2.380	0.123
Finland	1	2.258	0.133	1	3.389	0.066***
France	3	1.141	0.767	2	0.594	0.743
Germany	3	6.156	0.104	1	0.056	0.812
Greece	3	2.982	0.394	2	1.888	0.389
Iceland	3	5.076	0.166	3	4.951	0.175
Ireland	1	0.039	0.844	1	0.011	0.917
Israel	1	7.481	0.006*	1	1.557	0.212
Italy	1	0.119	0.731	1	0.350	0.554
Japan	1	0.317	0.573	1	0.102	0.750
Korea, Rep.	1	3.492	0.062***	1	2.563	0.109
Latvia	2	1.520	0.468	2	1.415	0.493
Lithuania	1	0.315	0.575	1	0.014	0.905
Luxembourg	2	0.301	0.860	2	11.059	0.004*
Mexico	1	0.366	0.545	1	0.965	0.326
Netherlands	3	10.291	0.016**	1	0.178	0.674
Norway	1	0.955	0.328	1	0.474	0.491
Poland	1	3.044	0.081***	3	4.620	0.202
Portugal	1	0.148	0.700	1	0.046	0.831
Slovak Republic	1	0.084	0.773	1	0.000	0.984
Slovenia	1	3.881	0.049**	3	8.834	0.032**
Spain	1	0.311	0.577	2	2.329	0.312
Sweden	1	1.006	0.316	1	0.028	0.866
Turkey	1	1.049	0.306	1	0.517	0.472
United Kingdom	3	2.470	0.481	1	0.762	0.383
United States	3	12.027	0.007*	3	0.674	0.879
Panel Fisher		83.005			107.827 ***	

CONCLUSION

This paper investigates the link between tourism, CO2 emissions, and economic growth utilizing CCE approach developed by Pesaran (2006) and AMG approach proposed by Eberhardt and Teal (2010) for selected OECD countries for the period of 1995-2014. This study lastly utilizes the Emirmahmutoglu-Kose panel Granger causality test so as to demonstrate the direction of causality among tourism, CO2 emissions, and economic growth for the countries under investigation.

Given the span of data set and the CCE and AMG results, the results show that tourism enhances CO2 emissions in OECD countries, suggesting that an

increase in tourist arrivals leads to an increase in CO2 emissions. Also, our results reveal that economic growth contributes to environmental degradation in these countries. Moreover, Emirmahmutoglu-Kose panel Granger causality test provide evidence of unidirectional association running from tourism to CO2 emissions in OECD countries.

Given these results, we strongly suggest more attention on implementation of policies for the sustainability of tourism. The findings show that while tourism contributes to economic growth in OECD countries, it also increases CO2 emissions. This imply that policy makers should follow the policies, aiming at not only to expand the tourism but also reduce CO2 emissions. Therefore, stakeholders should take into account investing in more clean energy sources and especially clean transportation applications and decreasing the share of fossil fuel energy in tourism activities to lower the harm to the environment while promoting economic growth at the same time.

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