Investigation of the Relationship between Renewable Energy, Tourism Receipts and Economic Growth in Europe

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Abstract

By using the Pedroni and Kao panel co-integration techniques, and FMOLS, DOLS and OLS methods, this study explores the long-run relationship among tourism receipts, renewable energy consumption and economic growth for the European Union countries. The long-run estimators report that "renewable energy increases economic growth", "tourism receipts increase economic growth", "capital increases economic growth" and "labor force increases economic growth". Further results and some policy implications are discussed in this empirical study.

Keywords

Tourism receipts, renewable energy, economic growth, European Union, Pedroni panel Co-integration tests

JEL code

C32, C33, L83, O44, Q20, Q28, Z32

INTRODUCTION

Tourism represents the major socio-economic activity in the European Union (EU) with a wide-ranging impact on the economic growth, trade, investments, employment and social development. Tourism can be a powerful tool in fighting the economic decline and unemployment, especially in the Member States in the Southern Europe, where tourism represents a large section of the domestic economy. During the financial crisis, tourism has proven to be a resilient element in the European economy. Taking into account the sectors that are connected to tourism, it generates over 10% of the European gross domestic product (GDP) and employs 10% of the European citizens (Slager, 2013; European Commission, 2013a). Europe has a large variety of top cities and popular travel destinations, with the highest density and diversity of tourist attractions. Europe is a high-quality tourist destination and offers a wide variety

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of products. Europe differs from other tourist destinations, because it aims a sustainable and high-quality tourism, plays to its comparative strengths, in particular the diversity of its countryside and the extraordinary cultural wealth (Slager, 2013; European Commission, 2013b).

Tourism represents one of the fastest growing industries in the world. The travel costs have decreased and the information on destinations are available almost all over the world. All of these represent elements that make the tourism sector a significant source of revenues and an engine of economic growth for the local economies (Işık et al., 2017; Işık, 2015; Paci and Marrocu, 2012; Akan et al., 2008).

Europe is considered as a prominent tourist destination, holding approximately a 51% share of the global tourist arrivals in 2014 and this share was increasing (UNWTO, 2015). For this reason, the European Union (EU) has placed much emphasis on the tourism sector as an engine of the economic prosperity for its member countries (Lee and Brahmasrene, 2013). In a global scale, the total contribution of the tourism industry accounted for almost 10% of the world GDP and world employment in 2014 and these numbers are expected to increase in the long-run (WTTC, 2015). The tourism development has been established as a popular strategy for the economic growth not only in Europe but worldwide (Matarrita-Cascante, 2010; Andereck et al., 2005).

The total contribution of Travel & Tourism to employment grew by 2.3% in 2014, while its contribution to GDP grew by 3.6%, faster than wider economy in 2014 (especially for Greece and Turkey in Europe) (WTTC, 2015). Tourism lowered unemployment and increased the household income and government income (Mello-Sampayo and Sousa-Valea, 2012). Thus, tourism has determined the economic growth in many countries, especially in small countries where the tourism represents the main sector bringing high revenues, such as in Malta, but also in larger countries (Spain).

Europe remains the top destination region around the world due to its rich cultural heritage, high quality of the tourism service infrastructure, hygiene conditions, and high level of international openness and integration. Spain and Italy lead this ranking, but Spain displays a more pro-active strategy in the tourism area, while Italian strategy is more passive. The business climate is also important for tourism. In the Northern European countries, it is lean, while in South-Eastern Europe it is less sound (WEF, 2015).

In 2014, Spain was the first tourism destination in the EU for non-residents, with 260 million nights spent, or 21.5% of the EU-28 total. Across the EU, the top four most popular destinations for non-residents were Spain, Italy (187 million nights), France (131 million nights) and the United Kingdom (105 million nights), which together accounted for more than half (56.6%) of the total nights spent by non-residents in the EU-28 (Eurostat, 2015).

The economic importance of international tourism can be stressed if we consider the share of international travel receipts of GDP. In 2014, this share was highest in Croatia (17.2%), Malta (14.4%) and Cyprus (12.3%), confirming the importance of tourism to these small countries. The contribution of the tourism sector to GDP increased if we compare with the data available at the end of 2010: the contribution of tourism to the GDP growth was highest in Cyprus (10,4%), Malta (7,9%), Spain (6,3%), Greece (6,5%), Portugal (5,9%), Austria (5,5%) and Croatia (5,1%) (Eurostat, 2015).

In absolute terms, the highest international travel receipts in 2014 were recorded in Spain (EUR 49 billion) followed by France (EUR 43 billion), United Kingdom (EUR 35 billion), Italy (EUR 34 billion) and Germany (EUR 32 billion). In Europe, Turkey displayed travel receipts in 2014 of 22 billion EUR, Austria reached 15 billion EUR, Greece 13 billion EUR, Netherlands 11 billion EUR, Belgium and Portugal each with 10 billion EUR. Spain was the EU Member State with the highest level of net receipts from travel in 2014 (EUR 35.4 billion), while Germany recorded the biggest deficit (EUR –37.6 billion) (Eurostat, 2015).

Spain ranks first in the Top Travel and Tourism Competitiveness Index 2015. It is the third most visited country in the world in 2015, with approximately 60.6 million arrivals in 2015. It displays many beautiful heritage sites and it has large cultural resources (WEF, 2015). France ranks 2nd overall

in the Top Travel and Tourism Competitiveness Index 2015 and it displays over 84 million arrivals, ranking first in Europe in 2015. France displays large cultural and natural resources. Even during the crisis, the hospitality sector played an important role in job creation and supported the economic recovery. During the crisis, France reduced VAT tax for accommodation and food served in the hotels and restaurants and thus supported the hospitality sectors. Switzerland has world-class tourist services infrastructure and an extremely conducive business environment. Switzerland has some beautiful mountain landscapes. Italy is famous for its towns, monuments and its numerous World Heritage sites. The Russian Federation ranks 45th overall. Although in the Russian Federation the tourism is not a national priority, its natural and cultural heritage shows how the tourism industry could potentially play a bigger role in the country's economy (WEF, 2015). Russian Federation together with Poland have currently a market share of 2.4% in Eastern Europe regarding the tourism receipts. They are the only Eastern competitors among the European countries (if we consider tourism receipts in million Euro) (WEF, 2015).

The continued success of the hospitality sector in Austria is in part due to the stability of the tax climate with a reduced VAT tax for its major hospitality services. A reduction of VAT for the hospitality sector could have been seen in all major tourism destination countries all over the Europe during the crisis period for supporting the hospitality sector (Turkey, Spain, France, Germany, except Greece and Portugal where the tax on hospitality services have increased after 2009 and Italy where the overall levels of taxation in the hospitality sector have increased after 2011, although the VAT is reduced for almost all of the hospitality services). The Netherlands faced the same situation regarding taxation in the hospitality sector as in Italy, while in Eastern European countries the overall levels of tax have increased during the crisis. UK is among the few European countries that doesn't apply a reduced VAT for the hospitality services (WEF, 2015).

This empirical research contributes to the economic literature in several aspects. First, it is the first study that applies and the ordinary least squares (OLS) with fixed effects, the fully modified OLS (FMOLS) and the dynamic OLS (DOLS) along with co-integration tests to analyze the impact of renewable energy and tourism on economic growth in the European Union countries. The tourism and renewable energy sectors play an important role for the economic developments, especially in the Southern Europe. The Southern European countries are in the top 10 of the most visited countries around the world. Moreover, this study uses renewable energy and its relationship with the tourism receipts and economic growth.

The aim of this empirical research is to analyze the relationship between international tourism receipts, renewable energy consumption, capital, labor and economic growth. To achieve this aim, we use the Pedroni and the Kao panel co-integration tests to see if there is a long-term relationship between the analyzed variables and the FMOLS, the DOLS and the OLS estimation methods to mainly analyze the impact of the tourism receipts and renewable energy on economic growth in the European Union countries. Section 2 presents some findings of the economic literature on the topic of our study. Section 3 presents the methodology and data we have used to study the relationship between the tourism receipts, renewable energy and economic growth and discusses the results. Section 4 concludes the paper and presents some policy recommendations.

1 LITERATURE REVIEW

A number of studies have examined the long-run the relationship between tourism or renewable energy consumption measures and economic performance within a country-specific context. Determining the long-run relationship between tourism development, economic growth, and renewable energy is of paramount importance for designing a sustainable growth agenda regarding tourism development and environmental issues. However, it is not clear whether renewable energy consumption induces economic growth and tourism development (or vice versa) because there is a few research that tests the long-run relationship between these factors.

The rapid growth in both international and domestic travel, the trends to travel farther and over shorter periods of time, and the preference given to energy-intensive transportation are increasing the non-renewable energy dependency of tourism, resulting in the sector's contribution of 5% to global GHG emissions. The greening of tourism is expected to reinforce the employment potential of the sector with increased local hiring and sourcing and significant opportunities in the tourism oriented toward the natural environment (Lawrence Pratt et al., 2011).

The tourism sector's growing consumption of energy, especially in the travel and accommodation, and its dependence on fossil fuels has important implications for the global GHG emissions and climate change as well as for the future business growth. The sustainability and competitiveness of tourism depends in part on the energy efficiency (reductions in the overall energy use) and a more intensive use of the renewable sources (Dogan et al., 2015; Işık, 2013; Işık, 2010).

Growth, conservation, feedback and neutrality hypotheses are committed to investigate the relationship between economic growth and energy consumption or tourism. However, the literature reports mixed results supporting unidirectional relationship from tourism or energy consumption to economic growth (growth hypothesis) and from economic growth to tourism or energy consumption (conservation hypothesis), bidirectional relationship between economic growth and tourism or energy consumption (feedback hypothesis), and no relationship (neutrality hypothesis). So the relationship between the tourism or energy consumption and economic growth differs in time and across countries or regions around the world. Table 1 presents a comprehensive review of studies found in both energy economics and tourism literature.

Table 1 Long-term Energy Growth – Tourism Relationship

From Energy Consumption or Tourist to Growth

Author	Time	Destination	Methodology	Variables	Results
Dogan (2015)	1990–2012	Turkey	ARDL	RE&Y	Neutrality hypothesis between RELC and GR, and between NRELC and GR in the short run and from RELC, NRELC, *K* and *L* to GR as well as from GR, RELC, *K* and *L* to NRELC in the long run, growth hypothesis between RELC and GR, and feedback hypothesis between NRELC and GR in the long run.
Işık and Shahbaz (2015)	1980–2010	OECD	Pedroni, Kao and Johansen Fisher Cointegration, Kao and Fixed Effect	RE&Y	RE → Y
Rezitis and Ahammad (2015)	1990–2012	South and Southeast Asian Countries	Dynamic Panel Data	RE&Y	RE → Y
Leon et al. (2014)	1998–2006	14 Developed, 31 less developed	The Generalized Method of Moments, GLS	Tourism, GDP, CO2, Population, Energy	Tourism has positive effect on 14 developed and 31 less developed countries
Lee and Brahmasrene (2013)	1988–2009	European Union Countries	Panel Cointegration & Fixed-Effects Models	Tourism, GDP, CO2	T → Y Y → CO2
Adhikari and Chen (2012)	1990–2009	80 Developing Countries	Panel Unit Root Test, DOLS	RE&Y	RE → Y
Tiwari (2011)	1965–2009	Europe and Eurasian Countries	PVAR approach	RE&Y	RE → Y
Ozturk et al. (2010)	1971–2005	51 Low and middle income countries	Panel Vector Error Correction Model	Energy & GDP	Y → RE (low income countries) RE ↔ Y (middle income countries)

Table 1 Long-term Energy Growth – Tourism Relationship continuation

Author	Time	Destination	Methodology	Variables	Results
From Economic Growth to Energy or Tourism					
Azam et al. (2015b)	1980–2012	Indonesia, Malaysia, Philippines, Singapore and Thailand	Johansen–Juselius Co-integration, Granger Causality	Energy & GDP	Y → RE REC (Malaysia) RE ⟛ Y (Indonesia, Philippines, Singapore and Thailand)
Menegaki (2011)	1997–2007	27 European countries	Random effect model	RE&Y	⧁
Ozturk et al. (2010)	1971–2005	51 Low and middle income countries	Panel Vector Error Correction Model	Energy & GDP	Y → RE (low income countries) RE ↔ Y (middle income countries)
No Relationship between Energy Consumption and Economic Growth					
Tugcu et al. (2012)	1980–2009	G7 countries	Hatemi-J causality tests	RE&Y	⧁ for France, Italy, Canada and USA Y → RE for Germany Y ↔ RE for England and Japan
Menegaki (2011)	1997–2007	27 European countries	Random effect model	RE&Y	⧁
Bidirectional Relationship between Energy Consumption and Economic Growth					
Shahbaz et al. (2015)	1972 Q1–2011 Q4	Pakistan	ARDL model Rolling window approach (RWA) Granger causality test	RE&Y	Y ↔ RE
Tang and Abosedra (2014)	2001–2009	MENA	Panel Data/General Ised Method of Moment	Energy, GDP, Tourism, Political Stability, Capital	Y ↔ RE
Al Mulali et al. (2014)	1985–2012	Middle East	Pedroni cointegration/ Panel Granger-VECM	Tourism, GDP, Real Exchange Rate, Total Trade	Y ↔ T
Bildirici (2013)	1980–2009	10 Latin American emerging and developing countries	ARDL approach ECM Model Granger causality test	RE&Y Biomass energy	Y ↔ RE
Tiwari et al. (2013)	1995–2005	OECD	Panel VAR/IRF/VD ARDL	Tourism, Energy, CO2	T ↔ RE
Kadir and Karim (2012)	1998–2005	ASEAN	Pedroni cointegration/ Panel Granger-VECM	Tourism, GDP	Y ↔ T

Notes: GDP = Y, E = Energy, T = Tourism, FDI = Foreign Direct Investment, C = Capital, CO2 = Carbon Dioxide Emission, GC = Granger Causality, JJ = Johansen–Juselius, VEC = Vector Error Correction Model, VAR = Vector Autoregressive Model, ECM = Error Correction Model, ARDL = Autoregressive-Distributed Lag, DOLS = Panel Dynamic Ordinary Least Squares and →, ←, ⧁, ↔ shows unidirectional relationship, bidirectional relationship, and no relationship, respectively.
Source: Authors' construction

As shown in Table 1, there is no consensus on both theoretical and empirical grounds on whether the tourism leads to growth, or growth leads to the tourism or bidirectional relationship between the variables and no relationship. This could be due to the fact that changes in the economic and/or the tourism conditions can alter the nature and magnitude of the long-run relationship between these two series over time, among others.

2 DATA, METHODOLOGY AND EMPIRICAL RESULTS

2.1 Data

Following researches Tang and Abosedra (2014), Leon et al. (2014), Dogan et al. (2015) and Tang et al. (2016) we have concentrated on the relationship of tourism – renewable energy – growth relationship. According to the World Development Indicators (WDI, 2016), 28 European countries are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherland, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden and the UK. Regarding to data description, economic growth is measured by real GDP (in constant 2005 US$); renewable energy consumption (REN) is the share of renewable energy in the final energy consumption; tourism receipts (RCPT) are expenditures by international inbound visitors, including payments to national carriers for international transport (in constant 2005 US$); capital (K) is gross fixed capital formation (in constant 2005 US$) and labor (L) is number of labor force. The model also includes the capital use and labor force, because it derives from a Cobb-Douglas function which determines the GDP growth as consistent with Paci and Marrocu (2012). The annual data for the analyzed variables are from 1995–2012 and provided by the WDI (2016). It is important that we use the available longest data.

2.2 Methodology and empirical results

As it is the main research proposal of this research to investigate the long-run relationship among economic growth, renewable energy consumption, tourism receipts, capital and labor, we should find appropriate and reliable estimation techniques. The standard OLS can be used to compare the outcomes with the FMOLS and the DOLS. The FMOLS, a non-parametric method, investigates adjustments for serial correlation whereas the DOLS, a parametric method, calculates lagged first-differenced terms. The lags, lead and contemporaneous values of the regressors are augmented when the DOLS is used (Pedroni, 1999).

Table 2 Panel Unit Root Tests Results

	Levels				
	GDP	**REN**	**RCPT**	**K**	**L**
LLC	4.05	–0.50	–2.47*	2.03	0.04
Breitung	8.99	4.13	–0.46	7.99	3.01
IPS	5.44	1.50	–0.66	2.83	1.21
Fisher-ADF	34.46	49.59	62.59	52.53	44.83
Fisher-PP	10.25	55.82	65.40	25.92	47.49
	First-differences				
	GDP	**REN**	**RCPT**	**K**	**L**
LLC	–11.54*	–14.56*	–7.81*	–13.15*	–11.95*
Breitung	–6.36*	–6.31*	–8.30*	–6.25*	–6.86*
IPS	–6.46*	–12.44*	–8.58*	–8.59*	–8.74*
Fisher-ADF	133.26*	230.41*	164.91*	158.76*	173.09*
Fisher-PP	192.04*	300.39*	251.03*	179.15*	210.81*

Note: * denotes the statistical significance at 1% level.
Source: Authors' own estimations

Table 2 shows results from the Levin-Lin-Chu (LLC) panel unit root test (Levin et al., 2002), the Breitung panel unit root test (Breitung, 1999), the Im-Pesaran-Shin (IPS) panel unit root test (Im et al., 2003), the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) panel unit root tests (Maddala and Wu, 1999). According to the reported results, the analyzed variables are not stationary at levels but

become stationary at first-differences at 1% level of significance. Thus, we need at least one co-integration test to see whether there is a long-run relationship among them. Otherwise, estimated coefficients will be without economic meaning.

Table 3 Pedroni panel and Kao panel Co-integration Test Results

a) Pedroni panel test

Common AR coefs. (within-dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	11.62*	0.00	7.85*	0.00
Panel rho-Statistic	2.65	0.99	2.98	0.99
Panel PP-Statistic	–5.11*	0.00	–5.86*	0.00
Panel ADF-Statistic	–5.28*	0.00	–5.43*	0.00
Individual AR coefs. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	4.82	1.00		
Group PP-Statistic	–12.71*	0.00		
Group ADF-Statistic	–8.29*	0.00		
b) Kao panel test				
	t-statistic	Prob.		
ADF	–6.70*	0.00		

Note: * denotes the statistical significance at 1% level.
Source: Authors' construction

This research uses the Pedroni panel co-integration test (Pedroni, 1999; 2004) and the Kao panel co-integration test (Kao, 1999). Results are reported in Table 3. Both methods suggest that the analyzed variables are co-integrated and thus have a long run relationship at 1% level of significance.

Table 4 Panel Long-Run Estimators

	Grouped-mean FMOLS		Grouped-mean DOLS		Fixed-effect OLS	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
REN	0.04*	0.03	0.01	0.61	0.09**	0.00
RCPT	0.06**	0.00	0.06*	0.02	0.05**	0.00
K	0.40**	0.00	0.37**	0.00	0.45**	0.00
L	0.77**	0.00	0.84**	0.00	0.62**	0.00

Note: * and ** denote the statistical significance at 5% and 1% level, respectively.
Source: Authors' own estimations

This study further applies the OLS with fixed effects, the grouped-mean DOLS (Pedroni, 2001), the grouped-mean FMOLS (Pedroni, 2000; 2001) in order to estimate the long run coefficients of tourism receipts, renewable energy consumption, capital and labor and to stress their impact on economic growth. Table 4 reports relevant outcomes. Because this study takes natural logarithmic of the analyzed variables, the reported coefficients can be interpreted as the elasticities of the dependent variable with respect to the independent variables. A 1% increase in renewable energy consumption stimulates economic growth by ranging from 0.04–0.09%. Similarly, a 1% increase in international tourism receipts boosts real GDP by around 0.06%. In addition, 1% rises in capital and labor increase economic growth

by ranging from 0.37–0.84%. The reported coefficients are statistically significant at 1% or 5% level. In short, increases in the analyzed variables (REN, RCPT, K and L) boost economic growth for the EU.

CONCLUSION AND POLICY RECOMMENDATION

Tourism and energy sectors involve a relatively low concentration in the literature focused on economic growth until recent years. As economic growth plays a key role in the economy, it is important for researchers to concentrate on the relationship between these two most essential industries and economic growth. Therefore, this empirical research aims to investigate the long-run dynamics of economic growth, renewable energy consumption, tourism receipts, capital and labor for the 28 European countries. By using several panel long-run estimators (FMOLS, DOLS and OLS), we find that results from the FMOLS, the DOLS and the OLS with fixed effects are consistent with each other. Increases in renewable energy consumption, tourism receipts, capital and labor stimulate economic growth in different magnitudes.

It is yet important to note that tourism sector is closely related to energy sectors. Tourism needs energy in order to keep on and thus energy sources should be used rationally for supporting a sustainable tourism and economic growth. Thus, a coherent and comprehensive policy frameworks renewable energy and tourism policies can contribute to economy in the long-run.

An interesting direction for a further research should be analyzing the causality between renewable energy, tourism receipts and economic growth using Granger causality tests. This way we can establish if there is a unidirectional, a bidirectional causality or no causality between economic growth-tourism receipts-renewable energy. A limitation of this research is represented by the fact that the paper doesn't present if there is an influence in terms of structure of the panel or if there is an influence in terms of size of the panel. The European countries are not homogenous as far as economic growth or the tourism receipts are concerned. A further research should be dividing the panel countries into separate groups and analyzing them separately because they present different features in terms of the tourism receipts or economic growth.

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