

DETERMINANTS OF TOURISM FLOWS TO GREECE: A GRAVITY MODEL APPROACH

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The purpose of this paper is to identify the main demand and supply determinants of international tourism flows to Greece, given the significant impact of tourism on the country's economy. For the empirical analysis the authors estimated an original gravity equation in which tourism flows depend on classic as well as experimental factors. The used dataset includes tourist arrivals from 19 countries over the period 2005-2015. The resulting coefficient of determination of this model is relatively high and the considered variables are statistically significant. Tourism flows to Greece are negatively affected by the bilateral distance and climate similarity between Greece and the origin countries; furthermore, the response variable is positively affected by the investments in the transport infrastructure, the country's stability, the incomes and the EU membership of the origin countries. The proposed recommendations to the Greek stakeholders include: creation of qualitative infrastructure; synergies with other sectors; boost of competitiveness; establishment of Greece as a safe destination; and, promotional campaigns.

Keywords: *Greece, tourism, gravity model, financial crisis, economic growth*



INTRODUCTION

An ever-increasing number of destinations worldwide have opened up and invested in tourism, turning it into a key driver of socio-economic progress through the creation of jobs and enterprises, export revenues, and infrastructure development (UNWTO Tourism Highlights, 2016).

International tourist arrivals grew by 4.4% in 2015, up to a total of 1,184 million (UNWTO Annual Report, 2015). The world has seen a 25% increase (or about 230 million) in international tourists between 2010 -2015. Europe remains the continent with the largest number of visitors, receiving 609 million in 2015, about 5% more than in 2014. Asia and the Pacific as well as the Americas hosted the second and the third largest number of international tourists in 2015, with 278 and 191 million, respectively.

Greece was ranked 31st out of 141 world economies in the 2015 Travel and Tourism Competitiveness Index (TTCI) Ranking (the TTCI, estimated by the World Economic Forum, comprises four sub-indexes, 14 pillars, and 90 individual indicators, distributed among the different pillars: Enabling Environment; Travel & Tourism Policy and Enabling Conditions; Infrastructure; Natural and Cultural Resources). Nevertheless, the country occupied the 81st position in the 2015-2016 rankings of the Global Competitiveness Index (the Global Competitiveness Index is estimated by the World Economic Forum and evaluates the competitiveness landscape of 140 countries).

Greece has a long tradition in tourism and hospitality mainly due to its history and ancient civilization (Buhalis, 2001; Sdrali and Chazapi, 2007), as well as to the unique Greek gastronomy (Kivela and Crotts, 2006; Tsiara, 2014). In 2014, Greece was the 15th most visited country in the world by international tourist arrivals (The World Bank, 2016).

Aiming to emphasize the importance of tourism we quote below some key tourism facts and determinants for both the international and the Greek tourism industry.

Key facts: global tourism

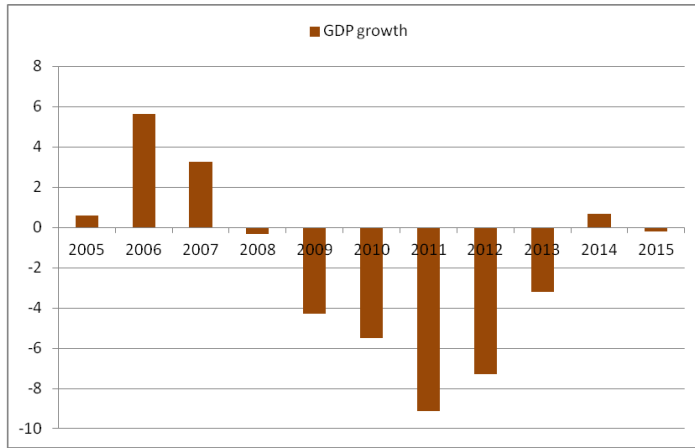
The travel and tourism sector will perform better than the overall economy in 2016 and will achieve positive growth for the sixth consecutive year (World Travel and Tourism Council, 2016). A steady progress of tourism contributes to poverty alleviation and affects positively international trade flows, economic growth and infrastructure development.

The travel and tourism sector affects directly and indirectly the gross domestic product (GDP) and plays a crucial role in generating employment worldwide. The Oxford Economics global industry model confirms the positive trend, estimating an annual average growth of about 3,9% over the next ten years for the Travel and Tourism direct industry GDP, while the respective estimation for the total global economy is 2,9%. The corresponding contribution to global GDP in 2015 was 9,8%, while the number of jobs created by the sector increased by more than 7 million.

Key facts: Greek tourism

The GDP growth in Greece (Figure 1) was positive in 2014, after 6 years of negative trend, mainly as a result of the global financial and economic crisis that started in 2007 - 2008. The GDP in 2015 returned to negative growth again, decreasing at an annual rate of about 0,2%.

Figure 1. Gross domestic product (GDP) growth (annual percentage) of Greece 2005-2015



Source: Authors' elaboration with data from the World Bank & ELSTAT

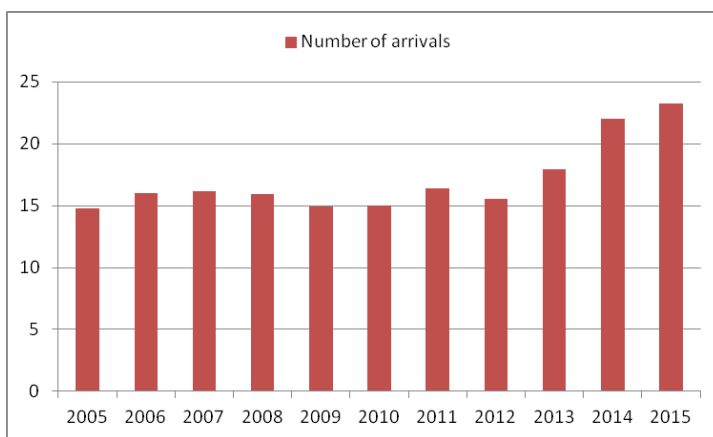
During the period 2005 - 2014, the total contribution of tourism to the Greek GDP ranged from approximately 15% to 20%. In 2015, the direct contribution of Travel and Tourism sector to Greek GDP was 17,242.8 billion euros or 9.8% of total GDP, while the total contribution to GDP for the same year was 37,934 billion euros (multiplier: 2,2) or 21.6% (Hellenic Statistical Authority – ELSTAT; Bank of Greece; Maroulis & Ikkos, 2016).

As for the total contribution of the Greek tourism to employment, it was 14.9% in 2010 and reached 17.9% in 2014. In 2015 travel and tourism contributed directly to 325.600 jobs, which corresponded to 9.0% of the total employment, while the indirect (total) contribution was 18,9% or 682.800 jobs (Hellenic Statistical Authority – ELSTAT; Maroulis & Ikkos, 2016).

In 2015, the country occupied the 23rd position in the world as regards the visitor exports, generating 16,5 billion dollars (World

Travel and Tourism Council, 2016). In the same year, the total number of international tourists to Greece (Figure 2) was more than 23 million, about 5,7% higher than in 2014 (SETE - Greek Tourism Confederation, 2016). This was the third consecutive year with a positive growth since 2012, when the number of arrivals had declined by 5,5% (The World Bank, 2016).

Figure 2. Number of international tourist arrivals (in millions) to Greece 2005-2015

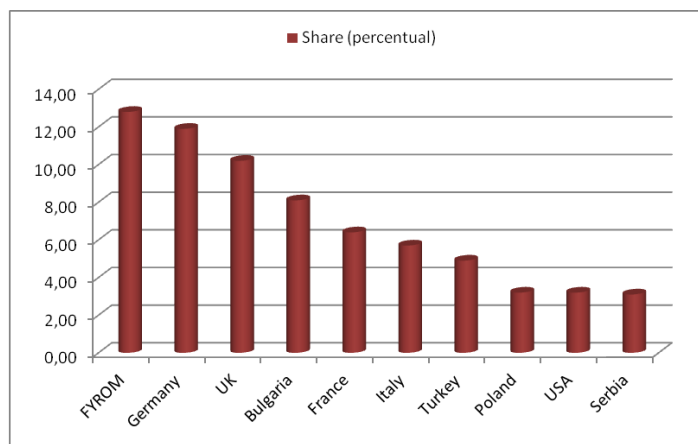


Source: Authors' elaboration with data from the World Bank & SETE

Over the past ten years, the top tourism markets for Greece have been Germany, the United Kingdom, France, Italy and the Netherlands. In 2015, some of the largest tourist groups (Figure 3) originated from FYROM, Germany and the United Kingdom with 12,8%, 11,9% and 10,2% of all non-resident arrivals, respectively. The vast majority of foreign visitors to Greece are European citizens, constituting 87,8% of the total non-resident arrivals in

2015, while the corresponding shares of visitors from Asia and the Americas were 6,4% and 4,6%, respectively.

Figure 3. Arrivals of international tourists to Greece in 2015 by nationality (percentual share)



Source: Authors' elaboration with data from ELSTAT

The above key tourism facts show the significant impact of the tourism industry on the Greek economy. Therefore, it is considered interesting and beneficial to identify the demand and supply determinants of international tourism flows and introduce them to the competent bodies.

The purpose of this paper is three-fold:

1. To highlight the significance of tourism in the Greek economy, particularly during the economic recession.
2. To identify the main demand and supply determinants of international tourism flows to Greece.

3. To utilise the research findings in order to illustrate how the Greek stakeholders could improve the tourism industry and the economy as a whole.

The publications aimed at investigating the determinants affecting the tourism flows to Greece are very few and, thus, the authors conducted this study and estimated an original gravity model consisting of classic and experimental demand and supply factors. The model was estimated through *plm*, a package of R software for panel data estimators.

The text is structured as follows: the Introduction highlights the importance of tourism in the global and Greek economy. The Literature Review introduces the background of the gravity theory, as well as previous empirical studies on tourism determinants. The Methodology part analyses the followed steps for the model estimation and contains: the model variables; the origin countries included in the dataset and data sources; basic descriptive statistics for the international tourism flows between Greece and the selected sample of origin countries, as well as the corresponding independent variables; results of the estimated gravity model. The Findings and Discussion section summarizes the research findings in both the demand side (selected origin countries) and supply side (Greece) and includes the proposed solutions for the Greek stakeholders towards improving the tourism industry, and through this the country's total economy. Finally, the Conclusion part includes concluding remarks and outlines in a figure the paper's purpose, methodology, principal results and recommendations. The used References are quoted at the end of the paper.

LITERATURE REVIEW

The literature consists of two parts, which are the background of the gravity theory and various empirical studies on gravity theory in the field of tourism.

The gravity theory

The dependent variable in a gravity model, a flow of individuals or assets, is based on variables related to the origin, as well as to the destination and other variables associated with the distance between countries. Empirical estimations of gravity models are usually characterized by high coefficients of determination, an indicator of a high explanatory power.

The first authors who applied the gravity theory were Tinbergen (1962) and Pöyhönen (1963), affirming that trade flows between two countries are positively affected by the economic sizes and negatively affected by the corresponding distance. The first theoretical foundations of the gravity model were set by Anderson (1979) and were dependent on a constant elasticity of substitution (CES) expenditure function.

Bergstrand (1985) also assumed a CES function to define a gravity equation for trade flows which included price variables. Empirical results confirmed the impact of exchange rates and prices on bilateral trade flows. Furthermore, according to the model estimation, goods are differentiated by place of origin and the law of one price is violated.

Bergstrand (1989) developed a general equilibrium model of trade, incorporating the monopolistic competition approach of Helpman (1987). The author assumed economies of scale and considered two differentiated products and two factors.

According to Krugman (1979 and 1980), international trade is not necessarily stimulated by differences in factor endowments and technology advancement. Trade is closely related with the expansion of markets and with the utilization of economies of scale, which contribute to decreasing production costs.

Deardorff (1998) explained gravity equations through the Heckscher-Ohlin model of trade equilibrium, which is based on the theory of comparative advantage, formulated by Ricardo in 1815.

Head and Mayer (2014) focused on the appropriate methods of gravity models estimation and emphasized the lack of theoretical knowledge in underlying determinants of trade costs.

According to Newton's law of universal gravitation, the gravitational force between two objects (object 1 and object 2) is directly proportional to the masses product and inversely proportional to the square of the corresponding distance:

$$F_g = G \frac{m_1 m_2}{r^2}$$

where F_g is the gravitational force between the objects, G is the gravitational constant; m_1 is the mass of object 1 and m_2 is the mass of object 2; r is the distance between the objects. We adapt the above expression for international tourism and consider the logarithmic transformation:

$$\ln(\text{TOU}_o) = c + a_i + b \ln(X_i^T) + e_{ij}$$

in which TOU_o is the tourism flow from a specific origin o to Greece; X^T contains the explanatory variables of the dependent variable; a_i represents the unobservable individual effects; c is a constant and e_{ij} is the individual error term, uncorrelated with the explanatory variables.

Empirical studies on tourism flows

The gravity theory has been applied in a large number of empirical works on international trade, migration, foreign direct investments and tourism. The major part of these studies are concentrated on the investigation of trade flow determinants, whereas the gravity model of tourism has been estimated in a relatively small number of works.

Crouch (1994) analyzed a significant number of quantitative works related to international tourism demand, concluding that there is a large number of explanatory variables to take into consideration, depending on the origin and destination countries, the selected data frequency and sample, etc.

Khadaroo and Seetanah (2008) employed a gravity model approach, in which they emphasized the role of transport infrastructure and some other basic independent variables in international tourism flows for a considerable number of African countries.

Fourie and Santana-Gallego (2010) estimated a standard gravity model between 200 countries in order to evaluate the impact of the so-called 'mega-sporting events' on international tourism flows. They found out that there is a positive effect on the number of tourists, despite the high level of government expenditures occurred.

Eryigit, Kotil and Eryigit (2010) used a gravity-based eight-factor model which was found to have good explanatory power. From the examined factors (Gross Domestic Product - GDP per capita, tourism climate index, Tourism Price Index-TPI, population and the distance variables, as well as the earthquake of 1999 and the September 11 attacks as dummies), the negative distance effect and the tourism climate index were found to be the most important indicators of the tourism flows. An unexpected finding, however, was the relative insignificance of the Iraq War (2003) dummy.

Kassean and Gassita (2013) analyzed the main push and pull factors that influence the choice of a particular tourist destination. According to the empirical results, relaxation and rest are the most important push factors, while pull motivations include climate, beaches, flora and fauna, hospitality and culture.

Marrocu and Paci (2013) investigated the determinants of tourism for a number of Italian provinces through the estimation of spatial autoregressive models and gravity equations, stressing the presence of high degree of spatial interconnectivity in tourism flows.

Chasapopoulos, den Butter and Mihaylov (2014) estimated a gravity model for tourism flows from 31 countries to Greece, and concluded that distance and bilateral trade are the principal explanatory variables. Political stability and prices in competing destinations also showed a statistically significant relationship with the number of international tourists visiting Greece.

METHODOLOGY

The gravity model estimated in this section consists of classic and experimental demand and supply factors, which affect international tourism flows to Greece. The model was estimated through plm, a package of R software for panel data estimators. Song and Li (2008) analyzed a relevant number of past empirical applications and concluded that the annual number of foreign visitors was the most used estimator of international tourism demand.

Model variables

We use the GDP per capita as an income estimator, while the bilateral distance between Greece and the origin countries approximates tourism costs. We consider different supply factors such as the transport infrastructure investment and maintenance spending, and the world development indicator of political stability and absence of violence or terrorism. We also include two dummy variables related to the European Union membership of the origin countries and to the respective climate similarity with the destination. We take into consideration the augmented gravity model:

$$\begin{aligned}
\text{tou_ot} = & \alpha_1 + \alpha_2(\text{gdpcap_ot}) + \alpha_3(\text{tiims_t}) + \alpha_4(\text{psavt_t}) \\
& + \alpha_5(\text{dist_o}) + \alpha_6\text{EURO_ot} + \alpha_7\text{CLIMA_o} + \varepsilon_ot
\end{aligned}$$

The variables definition and the expected effects for the considered explanatory variables are summarized in the Table 1.

Table 1. Variables definition & explanatory variables' expected sign

<i>Variable</i>	<i>Definition</i>	<i>Expected sign</i>
<i>tou_ot</i>	<i>Natural logarithm of tourism flow from origin o to Greece at year t.</i>	<i>Dependent variable</i>
<i>gdpcap_ot</i>	<i>Natural logarithm of GDP per capita in origin o at year t.</i>	+
<i>tiims_t</i>	<i>Natural logarithm of transport infrastructure investment & maintenance spending in Greece at year t.</i>	+
<i>psavt_t</i>	<i>World development indicator of political stability & absence of violence/terrorism for Greece at year t.</i>	+
<i>dist_o</i>	<i>Natural logarithm of the distance between origin o & Greece.</i>	-
<i>EURO_ot</i>	<i>A dummy variable that has a value of one if the respective origin country is a European Union member & equals zero otherwise.</i>	+
<i>CLIMA_o</i>	<i>A dummy variable that has a value of one if Greece & the respective origin country have a similar climate & equals zero otherwise.</i>	+ or -

Origin countries and data sources

Our dataset includes tourist arrivals from 19 countries and the corresponding determinants from 2005 to 2015. The considered origin countries (Table 2) constitute almost 60% of all international visitors to Greece for the selected time period. SETE - Greek Tourism Confederation and the Bank of Greece were our sources of international tourists.

World development indicators of political stability and absence of violence/terrorism, GDPs and the respective population data were sourced from the World Bank. Bilateral distances between Greece and the origin countries were obtained from the CEPII GeoDist database (Mayer and Zignago, 2011). Transport infrastructure investments and maintenance spending data were collected from the

Organisation for Economic Co-operation and Development (OECD). The dummy variable of climate similarity is based on the Köppen–Geiger climate classification system.

Table 2. Origin countries included in the dataset

1	<i>Albania</i>	11	<i>Italy</i>
2	<i>Australia</i>	12	<i>Netherlands</i>
3	<i>Austria</i>	13	<i>Romania</i>
4	<i>Belgium</i>	14	<i>Russia</i>
5	<i>Canada</i>	15	<i>Spain</i>
6	<i>Cyprus</i>	16	<i>Sweden</i>
7	<i>Czech Republic</i>	17	<i>Switzerland</i>
8	<i>Denmark</i>	18	<i>United Kingdom</i>
9	<i>France</i>	19	<i>United States</i>
10	<i>Germany</i>		

Descriptive statistics

The Table 3 shows basic descriptive statistics for the international tourism flows between Greece and the selected sample of origin countries, and the corresponding independent variables.

Table 3. Basic descriptive statistics for tourism flows & the corresponding determinants

VARIABLE	tou_ot	gdpcap_ot	tiims_t	psavt_t	dist_o	EURO	CLIMA
<i>MIN</i>	92000	2709,1	1626406705	-0,224	500,124	0	0
<i>MAX</i>	2877000	88002,6	4096962899	0,638	15337,680	1	1
<i>Mean</i>	628964,7	38667,0	2676792345,2	0,124	3102,457	0,675	0,263
<i>Median</i>	364700	41732,7	2521558080	0,024	2098,726	1	0
<i>Std.Deviation</i>	648111,4	18331,9	773168434,2	0,312	3521,874	0,470	0,441
<i>Asymmetry</i>	1,952	-0,178	0,431	0,401	2,444	-0,751	1,083
<i>Kurtosis</i>	2,939	-0,109	-1,036	-1,412	5,350	-1,450	-0,834

Note: Variables are considered in their original form. GDPs per capita and transport infrastructure investments and maintenance spending are expressed in US dollars. The distance is expressed in kilometres.

RESULTS OF THE ESTIMATED GRAVITY MODEL FOR TOURISM

Table 4 shows the results of the estimated model through Swamy-Arora random effects, the method that performed better. By applying this estimation technique, we assume that the specific effects of each origin country are uncorrelated with the explanatory variables. In a random effect estimation, the variability across countries is supposed to be irregular and we can consider variables that are constant over time such as the bilateral distance or the climate similarity dummy.

We observe that in all cases parameters are significant (significance level of 1%) and the respective sign effects are in line with the theory. The resulting adjusted R-squared value is also satisfactory: the model explains almost 57% of the variability of international tourism flows. These findings are comparable to previous similar empirical studies (Marrocu and Paci, 2013;

Chasapopoulos, den Butter and Mihaylov, 2014; Culiuc, 2014; Kaplan and Aktas, 2016).

Table 4. Estimation results of the gravity model for tourism

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> summary (ModRandom)
Oneway (individual) effect Random Effect Model
(Swamy-Arora's transformation)
Call:
plm (formula = tou ~ gdpcap_o + tiims + psavt + dist + EURO +
      CLIMA, data = y, model = "random", index = c ("code", "year"))

Balanced Panel: n=19, T=11, N=209
Effects:
              var      std.dev  share
idiosyncratic 0.05129  0.22647  0.071
individual    0.66995  0.81850  0.929
theta: 0.9128
Residuals:
      Min. 1st Qu.  Median 3rd Qu.  Max.
-0.691000 -0.127000  0.000186  0.112000  0.845000

Coefficients:
              Estimate Std. Error t-value Pr(>|t|)
(Intercept)  4.434473  1.456744  3.0441  0.0026779 **
gdpcap_o     0.981718  0.155441  6.3157  1.986e-09 ***
tiims        0.302438  0.095789  3.1573  0.0018610 **
psavt        0.215702  0.059851  3.6040  0.0004038 ***
dist         -0.832708  0.261385  -3.1858  0.0016976 **
EURO         0.260910  0.098828  2.6400  0.008998 **
CLIMA        -0.193816  0.0596721 -3.2480  0.001381 **
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Total Sum of Squares:  11.127
Residual Sum of Squares: 4.6022
R-Squared: 0.58638
Adj. R-Squared: 0.56981
F-statistic: 12.9468 on 6 and 202 DF, p-value: 2.277e-12

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Note: 'Estimate' is the estimated parameter value, 'Std. Error' is the standard error of the estimation, 't-value' is the estimated t-test, 'Pr(>|t|)' is the observed p-value, 'Adj. R-Squared' is the adjusted R-Squared

FINDINGS AND DISCUSSION

The significant decline in oil prices during the second half of 2014 was an important determinant of European and global economy. It stimulated the imports and the economic activity of oil importing countries, however it reduced the revenues of oil exporting countries. High levels of exchange rates volatility played also an important role in international trade, tourism and in economic growth variations.

The Greek economic growth turned negative in 2015, after the slight increase of 2014. The country is still suffering the consequences of the 2008-2013 economic and financial crisis, such as the political instability, and the high public debt and budget deficit. Other global factors have restrained the economic growth, including the armed conflicts in Syria, Iraq, Afghanistan, etc. These conflicts have created the refugee crisis, posing risks for the Greek economy.

On the other hand, recent years conflicts in competitor countries, such as Turkey and Egypt, have stimulated tourism flows to Greece. Tourism can be the driving force behind Greece's economic recovery. Tourism brings in revenues and it also means more jobs. For these reasons, several measures aiming to restructure, improve and boost the Greek tourism, should be taken by the country's policy makers. These measures include: investments in transportations and creation of quality infrastructure; development of proper synergies and interconnections with other sectors and branches of the economy; boost of competitiveness through tourism products that offer quality and value for money, such as city breaks, medical and nautical tourism, cultural and religious, and MICE (Kapiki, 2012; SETE - Greek Tourism Confederation, 2014).

Due to the frequent terrorist attacks in competitor countries of the Mediterranean Sea it is important for Greece to establish itself as a safe destination, since safety is of great concern for all tourists. This is expected to contribute significantly towards attracting more

tourists to Greece. Moreover, promotional campaigns effectively designed both for EU and several targeted distant countries (such as China, North America and Russia) could contribute to the long-term development of the Greek tourism industry.

This paper focuses on the empirical investigation of incoming international visitors to Greece from a set of 19 origin countries over the period 2005-2015. A particular gravity equation was estimated consisting of classic and experimental demand and supply factors, such as: GDP per capita in the origin countries; transport infrastructure investment and maintenance spending in Greece; political stability and absence of violence/terrorism in Greece; distance between the origin country and Greece; European Union membership of the origin country; and, climate similarity between the origin country and Greece.

According to the estimation results, international tourism flows to Greece are positively affected by the incomes and EU membership of the origin countries, the investments in transport infrastructure, the political stability and the security. On the contrary, the dependent variable is negatively affected by the distance between Greece and the origin countries, and by the corresponding climate similarity. A higher probability is observed and according to that an international visitor to Greece originates from a colder country, *ceteris paribus*.

Based on the above findings, we presume that the relaxation of political tension in the country, the effective implementation of reforms and the increase of investments in infrastructure would further develop the tourism sector. This will lead to higher economic growth, the decrease of the unemployment rate and the alleviation of social inequality in Greece.

CONCLUSION

The Greek economy has started stabilizing after the recession of the period 2008-2013. The GDP recovered by 0.7% in 2014 and decreased by 0.2% in 2015. Greece has a long tradition in tourism and hospitality and through proper measures tourism can be the driving force behind Greece's economic recovery.

This paper was intended to identify the main demand and supply determinants of international tourism flows to Greece as well as to illustrate how the Greek stakeholders could improve the tourism industry and the economy as a whole. In order to achieve the study purpose, the authors applied the gravity theory and estimated an original gravity model consisting of classic and experimental demand and supply factors. The model was estimated through plm, a package of R software for panel data estimators.

The estimation of the equation is based on a dataset covering the following 19 countries (in alphabetical order): Albania; Australia; Austria; Belgium; Canada; Cyprus; Czech Republic; Denmark; France; Germany; Italy; Netherlands; Romania; Russia; Spain; Sweden; Switzerland; United Kingdom; United States. These countries constituted almost 60 per cent of the total tourism demand in Greece over the period 2005 - 2015.

The model variables include the dependent variable which is the annual tourist arrivals to Greece, as well as the following explanatory variables: GDP per capita in the origin countries; transport infrastructure investment and maintenance spending in Greece; political stability and absence of violence/terrorism in Greece; distance between the origin country and Greece. Two dummy variables, namely the European Union membership of the origin country and, the climate similarity between the origin country and Greece were included in the model.

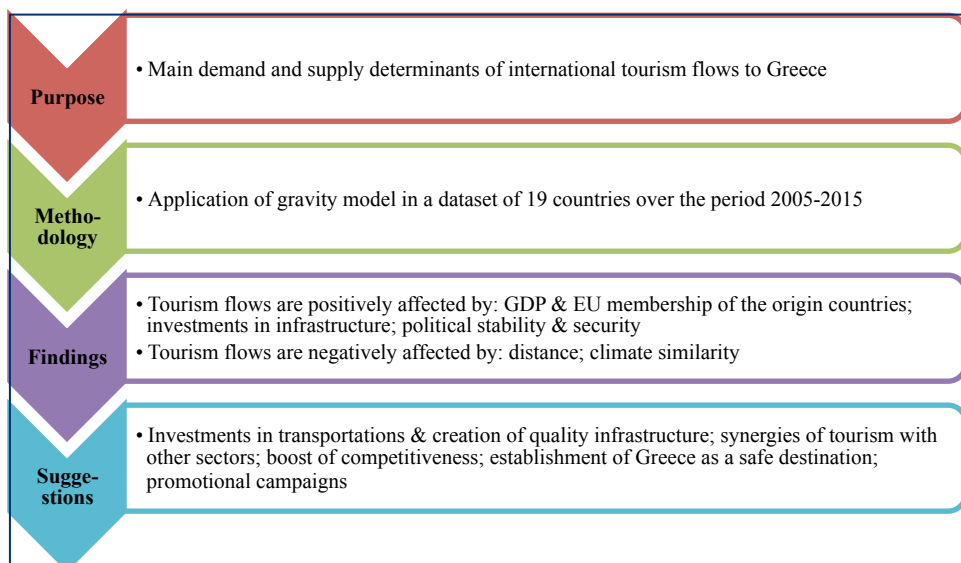
The estimated model shows that international tourism flows to Greece are positively affected by the incomes and EU membership of the origin countries, the investments in transport infrastructure,

the political stability and the security. Contrariwise, the tourism demand for Greece is negatively affected by the distance and climate similarity between Greece and the countries of the sample. *Ceteris paribus*, a higher probability is observed that an international visitor to Greece originates from a colder country.

Based on the findings of this research paper, the following recommendations are proposed to the Greek stakeholders: investments in transportations and creation of quality infrastructure with emphasis on the regional airports, ports, roads outside the highways, and on cleanliness; development of proper synergies and interconnections between the tourism industry and other sectors/branches of the economy such as the food and agricultural market, education, etc.; boost of competitiveness through tourism products that offer quality and value for money, including city breaks, medical/nautical and cultural/religious tourism, and MICE; establishment of Greece as a safe destination; promotional campaigns effectively designed both for EU and targeted distant countries.

The aforementioned purpose, methodology, findings and recommendations of the paper are outlined in Figure 4.

Figure 4. The paper's framework



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