

Camelia SURUGIU<sup>1</sup>  
Nuno Carlos LEITÃO<sup>2</sup>  
Marius Răzvan SURUGIU<sup>3</sup>

UDK 338.48(498)  
REVIEW  
PREGLEDNI RAD

## A PANEL DATA MODELLING OF INTERNATIONAL TOURISM DEMAND: EVIDENCES FOR ROMANIA

### *Abstract*

*This paper analysis the determinants of international tourism demand for Romania and it quantifies their influences. The authors elaborate two models, a fixed-effects model and the Tobit model, to estimate tourist inflow data from twenty-three European countries, for the period 1997-2008. In the fixed effects static panel model, we find that GDP per capita, bilateral trade, population, prices are the main determinants of tourism flows to Romania. For the Tobit model, all the variables taken into consideration, GDP per capita, bilateral trade, population, geographical distance, prices are influencing the international tourism demand. Both models indicate that trade, population, and income are more important determinants than relative prices or geographical distance between Romania and countries of origin.*

**Key words:** international demand, tourist arrivals, panel data model, trade, Romania

### 1. INTRODUCTION

Tourism role in the economy is a very important one, being a provider of many employment opportunities, and an important part of the production process that takes place in the economy of any country.

Even if during the last decades, tourism became one of the major industries in the world economy, in Romania, it is still struggling to regain its position in the European tourism, lost after '90s, due to economic, social and political transformations. Although declared "priority field of the national economy" (see Order no. 58/1998 regarding the organisation and development of the tourism activity in Romania), tourism sector had to deal with various problems, thus affecting domestic and international tourism demand.

As most experts suggest, through econometric models and empirical evidences, tourism sustains the economic development (Wahab and Pigram, 1997; Sinclair, 1998; Balaguer and Cantavella - Jordá, 2002; Sharpley and Telfer, 2002; Pender and Sharpley, 2005; Brau et al, 2008; Brida et al, 2008; Soukiazis and Proença, 2008; Zortuk, 2009), but still the causality relations are more complex, the economic, social, political, environmental, technological factors having a strong influence on tourism activities.

In the last years, international tourism demand attracted more economists and statisticians to estimate and forecast it, using various statistic and econometric models and different approaches of influence. Basically, the scientific tourism world identifies cause and effect relationships between tourism demand (tourist spending, tourist arrivals, tourist overnights) and variables that cause the tourists' flow.

The demand for international tourism and the choice of tourist destinations may be

---

<sup>1</sup> Ph.D., Scientific Researcher III, National Institute for Research and Development in Tourism, 17 Apolodor Street, Bucharest, Sector 5, Romania, Postal Code 050741, cameliasurugiu@gmail.com;

<sup>2</sup> Ph.D., Professor of Economics, ESGTS, Polytechnic Institute of Santarém, Santarém, Portugal E-mail: nunocarlosleitao@gmail.com;

<sup>3</sup> Ph.D., Scientific Researcher III, Institute of National Economy, Romanian Academy, 13 Calea 13 Septembrie, Bucharest, Sector 5, Romania, Postal Code 050711, mariussurugiu@yahoo.com.

subject to significant shifts for a number of reasons, including variations in income, prices, trade relations, as well as unexpected events, such as major terrorist attacks, political changes or climate changes, other special events. Even though international tourism is a form of international trade, it may be better dealt with in a single industry study (Eilat and Einav, 2004). International trade represents an engine for creating sustainable development opportunities for other components of the economy.

Romanian tourism industry passed through its ups and downs, tourism demand being strongly affected by the economic, social, political, environmental factors (i.e. fall of communism, transition period to the market economy, poor image abroad, environmental phenomena as floods or heat wave, avian flue). Starting with the '90s, Romanian tourism industry entered in a new era, mostly marked by significant decreased in tourism demand. Romanian tourism market became volatile and tourism demand more sensitive to market changes. The slow process of privatisation, low investments, decreasing in standard of living and purchasing power, poor management, lack of the tourism policies, strong competition of other tourist countries (i.e. Bulgaria, Turkey, Greece, Austria, Italy) were few of the causes, that have reduced substantially Romanian tourism activity and tourism demand. The strategy to promote Romania's tourism offer wasn't strongly enough to overcome the weakness of the already formed image of potential travellers. The important tour operators oriented to other tourism markets due to the low quality of services and the unbalance between prices and quality of tourism packages. The increase in tourist arrivals began starting with 2002 once with the revival of the Romanian economy. The increases in international arrivals show the changes occurring in social, economic and political context. This new openness of Romania marked the international relations with other world countries, having direct influence on the tourism flows.

In this general context, the present paper constructs a fixed-effects model for international tourist flows to Romania, from twenty-three European countries, for the period 1997-2008. We also introduced the Tobit model to estimate tourism demand. This methodology is important in forecasting, having policy implications. We analyse the determinants of tourist inflow in Romania taking into consideration a series of variables such as GDP per capital, international trade flows, population, distance and prices.

The paper is organized as follows. The second section surveys the existing tourism literature and discusses the variable of influence on tourism demand. The third presents the methodological approach and model specification by presenting two demand models to estimate inflow arrivals, one is the fixed-effects model, the other being Tobit model, and then discuss the empirical results and their economic interpretation. In panel data, pooled OLS, fixed-effects (FE) and random-effects (RE) estimators are used in this type of study. The RE estimator was excluded because our sample is not random. Furthermore, the Hausman test rejects the null hypothesis RE versus FE. The forth section concludes the paper results.

## **2. RELATED LITERATURE ON DETERMINANTS OF TOURISM DEMAND**

The tourism literature comprises a large number of papers regarding the tourism demand trying to model it using various techniques starting with simple or multivariate regressions (Garín-Muñoz and Amaral, 2000; Luzzi and Fluckiger, 2003; Allen and Yap, 2009), panel or pool data analysis, cointegration procedure (Lim and McAleer, 2001; Durbarry, 2002; Seetanah, 2006; Mervar and Payne, 2007), gravity models (Muhammad and Andrews, 2008; Hanafiah and Harun, 2010; Leitão, 2010), trends extrapolations, structural equations, data mining, neural network model (Law and Au, 1999), qualitative models. Except for simple guesswork, time-series and regression techniques have largely dominated the estimation models for international tourism demand. In using multiple regressions,

problems of misspecification in addition to heteroscedasticity, multicollinearity and autocorrelation arise, these technical problems not being always considered or resolved (Morley, 1993). Multiple regression models may assume different forms (i.e. Logit, Probit models) and different approaches (i.e. Confirmatory or Sequential).

International tourism demand models use most frequently, as dependent variables, the tourist arrivals/departures and the expenditures/receipts (Lim, 1997). The authors attempt to estimate an equation of the demand for tourism in order to analyse the different variables that influence the tourism demand (tourist arrivals, tourist nights spent) in a given destination. Income expressed as per capita gross domestic product or gross national product or national income or real income, total personal income, permanent income (Song and Witt, 2000; Garín-Muñoz and Amaral, 2000; Lim and McAleer, 2001; Luzzi and Fluckiger, 2003; Eilat and Einav, 2004; Nordström, 2005; Maloney and Rojas, 2005; Seetanah, 2006; Phakdisoth and Kim, 2007; Kareem, 2007; Mervar and Payne, 2007; Song and Fei, 2007; Muhammad and Andrews, 2008; Habibi et al, 2009; Allen and Yap, 2009; Garín-Muñoz, 2009; Hanafiah and Harun, 2010; Leitão, 2010) and relative prices (Song and Witt, 2000; Garín-Muñoz and Amaral, 2000; Lim and McAleer, 2001; Luzzi and Fluckiger, 2003; Eilat and Einav, 2004; Nordström, 2005; Phakdisoth and Kim, 2007; Kareem, 2007; Song and Fei, 2007; Habibi et al, 2009; Garín-Muñoz, 2009; Allen and Yap, 2009; Hanafiah and Harun, 2010; Leitão, 2010) are most commonly used variables. Exchange rates (Garín-Muñoz and Amaral, 2000; Lim and McAleer, 2001; Luzzi and Fluckiger, 2003; Eilat and Einav, 2004; Maloney and Rojas, 2005; Seetanah, 2006; Phakdisoth and Kim, 2007; Kareem, 2007; Song and Fei, 2007; Muhammad and Andrews, 2008; Hanafiah and Harun, 2010) were used as a proxy variable for price or together with the price variables.

Other exogenous variables are also considered, like distance or transportation costs (Lim and McAleer, 2001; Phakdisoth and Kim, 2007; Muhammad and Andrews, 2008; Allen and Yap, 2009; Hanafiah and Harun, 2010; Leitão, 2009), infrastructure as roads (Seetanah, 2006; Phakdisoth and Kim, 2007); population (Hanafiah and Harun, 2010; Leitão, 2010), tourism infrastructure as accommodation capacity (Seetanah, 2006), advertising expenditure (Song and Witt, 2000), consumer tastes or fashion (Song and Witt, 2000; Eilat and Einav, 2004), common language (Eilat and Einav, 2004). Usually, econometric models used by the authors also include dummy variables as crisis or extreme situations / special factors such as crime rate, political instability, special events, climate change (Eilat and Einav, 2004; Garín-Muñoz and Amaral, 2000; Phakdisoth and Kim, 2007; Kareem, 2007; Mervar and Payne, 2007; Song and Fei, 2007; Habibi et al, 2009; Allen and Yap, 2009; Garín-Muñoz, 2009; Taylor and Ortiz, 2009; Hanafiah and Harun, 2010). Some factors have a higher influence than others in different countries; still, certain variables like income, prices and exchange rates remain mostly used in econometric modelling. There is no theoretical or empirical consensus as to the proper set of independent variables to use (Morley, 1993).

In the early years of modelling tourism demand, log-linear regression was the predominant functional form (Li et al, 2005). Static regression models can suffer from a number of problems, including structural instability and spurious regression (Song and Witt, 2000). In order to avoid these problems, dynamic analysis have started to be explored in determining tourism demand (Moloney and Rojas, 2005; Garín-Muñoz and Montero-Martin, 2007; Phakdisoth and Kim, 2007; Kareem, 2007; Song and Fei, 2007; Habibi et al, 2009; Garín-Muñoz, 2009; Allen and Yap, 2009; Leitão, 2010). Advanced econometric methodologies such as cointegration, error correction models, vector autoregressive models, time varying parameter models and panel data approaches can be employed to overcome the problems associated with the traditional single-equation demand models (Song et al, 2008). For example, Seetanah (2006) derives an Error Correction Model (ECM) for international demand in Mauritius, dealing with problems of non-stationary time series and spurious

correlation. General-to-specific approach was applied by Song and Witt (2003), Song and Fei (2007).

A substantial attention has been given to other factors such as international trade, which has a significant influence on tourism demand. The questions rising from here refer to: Is international trade sustaining tourism demand? Is it a new or an old paradigm for international tourism in Romania?

A long-term bidirectional relationship between tourism and trade exists and this relationship is positive. The empirical results show that international trade plays a major role in influencing business tourism demand (Turner and Witt, 2001). Also, a country's exports have a positive effect on tourist arrivals (Muhammad and Andrews, 2008). Phakdisoth and Kim (2007) found that bilateral trade, which captures the economic relationships, also has a positive correlation with the tourist arrivals in Laos. Habibi et al (2009) found that the trade openness has an insignificant and positive impact on the tourism demand in Malaysia. The causality nexus in the sense trade causes tourism can appear since business travels are required to begin and to maintain the international trade of goods and services (Santana-Gallego et al, 2009). According to Leitão (2010), bilateral trade brings with it a preference for home-country products and can reduce transaction costs between home and host country.

Other authors don't find a strong relation between bilateral trade and international tourism. Using as proxy the intensity of the economic relations between countries, gross annual value of bilateral trade in goods between countries, respectively, Eilat and Einav (2004) model is showing that fluctuations over time in trade for a given pair of countries are uncorrelated with fluctuations in international tourism.

Shan and Wilson (2001) applied the methodology of Granger no-causality test to examine the causality linkage between international trade and international travel from China. The results indicate two-way causality running between trade and travel, thus encouraging the introduction of trade variable in tourism demand modelling.

Other authors analysed the causality relation resulting from tourism as tourist visits have impact on trade. Thus, tourism is thought to be able to promote cross-border exports by initiating entrepreneurial activities as a result of learning about new business opportunities, while travelling and demand for new products to be consumed back home may be created as a consequence of learning about them during foreign travel (Gil-Alana and Fischer, 2007). On the other hand, there are some criticisms on international tourism, Sinclair and Tsegaye (1990) founded that, although tourism has the advantage of high growth rates and is a major source of foreign currency receipts, earnings from international tourism did not bring about a significant decrease in the instability of export earnings of most of the developing and industrialised countries.

In our opinion trade and tourism are simultaneous sustaining one another, as international trade plays a prominent role in generating tourist flows from one country to another, stimulating for example inbound tourism to Romania from the European trade partners. On the other hand, tourism sustains trade through the consumption of different goods and services by travellers.

### **3. METHODOLOGICAL APPROACH AND MODEL SPECIFICATION**

Starting from the tourism literature, we determine which socio-economic variables of influence on international tourism demand for Romania case study should be included in the model and in what form. Before presenting the results of our estimations, we discuss the dependent indicators and explanatory variables, describe the data model and address the hypothesis.

### 3.1. ECONOMETRIC MODEL: EXPLANATORY VARIABLES AND DATA MODEL DESCRIPTION

For the researchers, tourist arrivals are the most common variable used in creating econometric models of tourism demand, beside the tourism expenditure and overnights.

In our empirical analysis, the estimation of international tourism demand in Romania from twenty-three different countries<sup>4</sup>, which represent 65-75% of all foreign arrivals in Romania, between the years 1997 and 2008, was finished. The data used to create the foreign tourists number series, as dependent variable, are annually collected from Romanian National Institute of Statistics. To avoid the seasonality problems, annual data were used.

First of all the descriptive statistics for panel data is presented in the following table.

**Table 1:**

**Descriptive statistics for panel data, 23 countries**

| Variable | Mean  | Media | Minimu | Maximu | Standar   | Coefficien | Skewnes | Ex.      |
|----------|-------|-------|--------|--------|-----------|------------|---------|----------|
| s        |       | n     | m      | m      | d.        | t of       | s       | kurtosis |
|          |       |       |        |        | Deviation | Variation  |         |          |
|          |       |       |        |        | n         |            |         |          |
| LogTOU   | 4.271 | 4.248 | 3.129  | 5.371  | 0.510     | 0.119      | 0.057   | -0.670   |
| LogGDP   | 4.160 | 4.326 | 3.131  | 4.628  | 0.351     | 0.0845     | -0.924  | -0.059   |
| LogTrad  | 1.462 | 1.514 | 0.154  | 2.660  | 0.654     | 0.447      | -0.104  | -0.972   |
| e        |       |       |        |        |           |            |         |          |
| LogPOP   | 7.128 | 7.010 | 6.297  | 7.917  | 0.455     | 0.064      | 0.371   | -1.022   |
| LogDIS   | 3.103 | 3.198 | 2.476  | 3.474  | 0.248     | 0.0798     | -0.759  | -0.015   |
| T        |       |       |        |        |           |            |         |          |
| LogPR    | 0.268 | 0.029 | -1.052 | 2.214  | 0.595     | 2.222      | 1.589   | 2.118    |

Source: data processed by authors

Following the literature review, we consider that demand for travel exports in Romania is a function of income, trade openness, population, distance between the origin country and Romania, prices.

$$TOU_{it} = f(GDP, TRADE, POP, DIST, PR) \quad (1)$$

Where

$TOU_{it}$  is the number of foreign tourist arrivals;  $GDP$  is the income in tourist generating countries;  $TRADE$  is the bilateral trade;  $POP$  is the total population in tourist generation countries;  $DIST$  is the geographical distance between Romania and the tourist generating countries;  $PR$  is the price.

A series of hypothesis were formulated, considering how the selected variables will influence the international tourism demand in Romania.

*Hypothesis 1: Tourism demand will be influenced by income of the tourists from the countries of origin*

The income' measure selected in this paper is the Gross Domestic Product per capita in the country of origin of tourists, expressed in constant 2000 US\$ and was collected from the World Bank. According to the literature, we expect that the number of foreign tourist arrivals to increase in Romania as the income in tourists' origin country increase. Therefore, the expected sign for the estimated coefficient of this variable is positive (Garín-Muñoz and

<sup>4</sup> The countries selected are Austria, Belgium, Bulgaria, Denmark, Switzerland, Finland, France, Germany, Ireland, Italy, Luxembourg, Norway, Netherlands, Poland, Portugal, Czech Republic, United Kingdom, Slovakia, Slovenia, Spain, Sweden, Turkey, and Hungary.

Amaral, 2000; Luzzi and Fluckiger, 2003; Phakdisoth and Kim, 2007; Muhammad and Andrews, 2008; Habibi et al, 2009; Hanafiah and Harun, 2010; Leitão, 2010).

*Hypothesis 2: International trade flows play an important role in sustaining tourism demand.*

In this study, volume of trade is hypothesized to affect the tourism demand for Romanian tourist destinations and it was therefore contained in the model to help explain the demand. The decision to include trade in tourism demand estimation is in line with that of Turner and Witt (2001), Eilat and Einav (2004), Phakdisoth and Kim (2007), Habibi et al (2009), Leitão (2010). Trade openness was estimated as:

$$TRADE_{it} = \frac{X_i + M_i}{GDP_{Romania} + GDP_k} \quad (2)$$

Where

$X_i$  represents the annual exports of Romania to the country of origin of each tourist at time  $t$  and  $M_i$  represents the annual imports of Romania from each tourist's country of origin at time  $t$ .  $GDP_k$  is the GDP per capita in tourist countries (constant 2000 US\$). The data for exports and imports were collected from Romanian National Institute of Statistics. We expect a positive sign for this variable.

*Hypothesis 3: Population changes in a country could positively sustain tourism flows*

The impact of population changes in a country is important to analyse. Most studies do not consider this variable, because population tends to be highly correlated with income (Leitão, 2009, 2010). The world population is getting bigger over time, clearly showing that all tourism multipliers are positively correlated with the natural log of population (Hanafiah and Harun, 2010). The population data were collected from the World Bank. We expect a positive sign for this variable.

*Hypothesis 4: International tourism demand is directly influenced by the distance from the countries of origin of the tourists and tourism destination country.*

Distance from the origin countries to the destination country is a powerful motivation for travellers. If all else remains equal, travellers will choose a destination that takes less time to reach there (Phakdisoth and Kim, 2007). The distance increases the transportation costs and thus the travel expenditure. The data source is CEPPII database (Centre d'Etudes Prospectives et d'Informations Internationales). We expect a negative sign for this variable.

*Hypothesis 5: The prices of goods and services from a particular tourism destination have a direct influence on the tourism demand.*

The price variable used for this study is purchasing power parities (EU27=100), meaning the price level differences across countries and expresses how many currency units a given quantity of goods and services costs in different countries. The data were collected from Eurostat.

According to the theory, the demand for international tourism is an inverse function of relative prices. As the cost of living in a particular destination is lower than those in the origin country of tourist, the greater the tourism demand and vice versa. The general level of prices in destinations is taken into account by travellers when making travel decisions (Eilat and Einav, 2004). We therefore expect a negative sign for this variable.

Therefore, the econometric model on estimating tourism demand takes the following representation:

$$\begin{aligned} \text{LogTOU}_{it} = & \alpha + \beta_1 \times \text{LogGDP}_{it} + \beta_2 \times \text{LogTRADE}_{it} + \beta_3 \times \text{LogPOP}_{it} + \beta_4 \times \text{LogDIST}_{it} \\ & + \beta_5 \times \text{LogPR}_{it} + \varepsilon_i \end{aligned} \quad (3)$$

Where, the variables were expressed in logarithm form.  $\alpha$  is the constant term,  $\beta_n$  are the coefficients of each variable taken into consideration,  $\varepsilon_i$  is the error term.

Two types of models were developed to estimate the international tourism demand for Romania, namely a fixed-effects model and Tobit Model. The following sections discuss the results of each econometric model.

### 3.2. RESULTS AND DISCUSSIONS

Given the model and data in which fixed effects estimation would be appropriate, Hausman-test tests whether random-effects estimation would be almost as good. The Hausman test rejects the null hypothesis random-effects versus fixed-effects. In our case, the random-effects estimator was excluded because our sample is not random.

**Table 2:**

#### Hausman test

Null hypothesis: GLS estimates are consistent  
Asymptotic test statistic: Chi-square(5) = 49.993  
P-value = 1.39068e-009

Source: data processed by authors

The results of fixed effects estimator are described in Table 3. The general performance of the model is very satisfactory. The explanatory power of the Romanian tourism demand regression is very high (R-squared=0.9596).

According to the results displayed, most of the variables have the expect signs and level of significance. A series of t-test at 1% and 5% significant level have been applied on each independent variable against the dependent variable. From the above panel model equation, *LogGDP*, *LogTRADE*, *LogPR* share the same significant level of 1%. *LogPOP* is significant at 5%. Just *LogDIST* was not significant.

**Table 3:**

#### Determinants of tourism demand: fixed effects

| Variables                                                             | Panel Model |                    | Expected Sign |
|-----------------------------------------------------------------------|-------------|--------------------|---------------|
|                                                                       | Coefficient | t-Statistics       |               |
| LogGDP                                                                | 1.353       | (4.957)***         | (+)           |
| LogTRADE                                                              | 0.466       | (6.764)***         | (+)           |
| LogPOP                                                                | 1.612       | (2.087)**          | (+)           |
| LogDIST                                                               | 0.270       | (1.419)            | (-)           |
| LogPR                                                                 | -0.508      | (-5.546)***        | (-)           |
| $\alpha$                                                              | -14.227     | (-2.443)**         |               |
| Observations = 276, Cross-sectional units=23, Time-series length = 12 |             | R-squared = 0.9596 |               |

T-statistics (heteroskedasticity corrected) are in round brackets.

Note: \*\*\*/\*\*- statistically significant, respectively at 1% and 5% level, respectively

Source: data processed by authors

The sign of *LogGDP* is positive, indicating that tourism demand is highly correlated

with GDP of the tourists' origin countries, which shows the impact on the standard of living (Garín-Muñoz and Amaral, 2000; Eilat and Einav, 2004; Seetanah, 2006; Phakdisoth and Kim, 2007; Kareem, 2007; Mervar and Payne, 2007; Muhammad and Andrews, 2008; Garín-Muñoz, 2009; Hanafiah and Harun, 2010; Leitão, 2010). Tourism demand in Romania is heavily dependent on the economic situation of the generating countries. GDP is one of the variables used in estimating tourism demand which describes the level of economic development, and its sign in the model corresponds also with the purchasing power, spending ability. According to the estimated short-run elasticity value (+1.353), tourism to Romania is considered by foreigners as a luxury service. A 1% increase in GDP per capita in the origin markets leads to a 1.353% increase in tourism arrivals to Romania. Hence, tourism demand is elastic on the short-run variation of the standard of living in generating countries. The income elasticity is above unity and thus confirms the idea that the international travel is a luxury good.

We expect that international trade would have a positive impact on the number of arrivals in Romania from any given country. The result corresponds to Eilat and Einav (2004), Muhammad and Andrews (2008), Leitão (2010) findings. Trade partners are an important vehicle to expand tourism (Leitão, 2009, 2010). The results indicate that tourism demand is inelastic to bilateral trade and has a positive correlation with the dependent variable. Tourism demand is not very responsive to changes in trade volume between Romania and respective countries.

The variable population (*LogPOP*) finds a positive sign, as we expected, and corresponds to the results of Hanafiah and Harun (2010), Leitão (2010). An increase of 1% of population of the origin country would generate 1.612% increased in foreign tourist arrivals to Romania.

As it regards relative price, the variable reduces the number of tourists to travel (Garín-Muñoz and Amaral, 2000; Seetanah, 2006; Phakdisoth and Kim, 2007; Garín-Muñoz, 2009; Hanafiah and Harun, 2010; Leitão, 2010), and the negative sign of the coefficient is the same as the expected one. The estimated price elasticity is -0.5077 suggesting that this demand is price inelastic. Different studies have used different measures of price explaining the differences in estimating price elasticities. Eilat and Einav (2004) suggest that tourism demand to less developed countries is not very sensitive to fluctuation in prices, explained by the fact that prices in these countries are relatively low.

The Table 4 presents the estimation results using Tobit model. The general performance of model is satisfactory. All explanatory variables are significant at 1% level (*LogGDP*, *LogTRADE*, *LogPOP*, *LogDIST* and *LogPR*).

The variable GDP (the income in tourist generation countries) is statically significant, with an expected positive sign. Vanegas (2009) and Phakdisoth and Kim (2007) also found this result. One of the main determinants of tourism demand is the positive impact in the Romanian economy.

The variable *LogTRADE* (bilateral trade) is statistically significant with a correct sign. This result demonstrates that bilateral trade promotes tourism. The studies of Eilat and Einav (2004), and Phakdisoth and Kim (2007) found this result.

The coefficient of the total population in tourist generation countries (*LogPOP*) finds a positive sign. Jud and Joseph (1974) and Fuji and Mark (1981) also found a positive sign.

**Table 4:****Determinants of tourism demand: Tobit Model**

| Variables                                                             | Tobit Model |              | Expected Sign |
|-----------------------------------------------------------------------|-------------|--------------|---------------|
|                                                                       | Coefficient | t-Statistics |               |
| LogGDP                                                                | 0.931       | (21.324)***  | (+)           |
| LogTRADE                                                              | 0.602       | (18.351)***  | (+)           |
| LogPOP                                                                | 0.3172      | (7.752)***   | (+)           |
| LogDIST                                                               | -0.3158     | (-4.059)***  | (-)           |
| LogPR                                                                 | 0.122       | (6.942)***   | (-)           |
| C                                                                     | -1.799      | (-8.308)***  |               |
| SIGMA                                                                 | 0.166       | (23.494)***  |               |
| Observations = 276, Cross-sectional units=23, Time series length = 12 |             |              |               |
| Log likelihood                                                        | 102.493     |              |               |

T-statistics (heteroskedasticity corrected) are in round brackets.

\*\*\* - statistically significant at 1% level.

Source: data processed by authors

In relationship with the relative price (PR), the dominant paradigm consider a negative sign (see Phakdisoth and Kim, 2007; Vanegas, 2009; Naudé and Saayman, 2005), and our result is positive. For Carey (1991) and Leitão (2009), the logarithm of price of tourist service (*LogPR*) presents a positive effect on tourism demand. Leitão (2009) refers that the tourism in Portugal tends to be a high quality service instead of a more expensive destination.

Overall, all independent variables are significant towards the dependent variable and it shows that there are significant relationships between these variables. In other words, there are relationships between tourism demand and trade, income, distance, population, and price.

#### 4. CONCLUDING REMARKS

This study investigated the impact of various specific factors across countries on tourist demand in Romania. Panel data using fixed-effects model results suggested that 96% of the variation in Romanian tourist inflows could be explained by real GDP per capita, trade relations, population and prices. All of the independent variables were significant in the panel data analysis, fixed-effects model, except for the distance. For the second model used, Tobit model respectively, all the variables, GDP per capita, bilateral trade, population, distance and prices significantly influenced the foreign arrivals. Overall, the greatest determinant of Romanian's tourist arrivals is real GDP per capita. We found that GDP per capita, trade and population have a significant positive influence on international arrivals, while for distance the results indicate that it has a negative influence on inflows, as expected. Generally, these estimates are in line with the results of previous empirical studies.

This research need to be extended as other factors have stronger influence on the tourism demand such as climate changes. Climate change is likely to have a significant impact on tourism flows (Taylor and Ortiz, 2009).

In order to sustain the international tourist arrivals in Romania is necessary for an increase in the income per capita and the results suggest that the international tourist flows are sustained by international trade and bilateral trade relations.

## ACKNOWLEDGEMENT:

This paper is supported by the Sectorial Operational Programme Human Resources Development (SOP HRD), financed from the European Social Fund and by the Romanian Government under the contract number SOP HRD/89/1.5/S/62988.

## REFERENCES

- Allen, D., Yap, G., (2009), "Modelling Australian domestic tourism demand: A panel data approach", 18th World IMACS/MODSIM Congress, Cairns, Australia, <http://mssanz.org.au/modsim09>.
- Balaguer, J., Cantavella-Jordá, M., (2002), "Tourism as a long-run economic growth factor: the Spanish case", *Applied Economics*, 34: 877-884.
- Brau, R., Lanza, A., Usai, S., (2008), *Tourism and sustainable economic development: Macroeconomic models and empirical methods*, Edward Elgar Publishing Limited.
- Brida, J.G., Carrera, E.J.S., Risso, W.A., (2008), "Tourism's Impact on Long-Run Mexican Economic Growth", *Economics Bulletin*, 3-21: 1-8.
- Durbarry, R., (2002), "Long run structural tourism demand modelling: An application to France", Discussion Paper, [http://www.nottingham.ac.uk/ttri/discussion/2002\\_1.pdf](http://www.nottingham.ac.uk/ttri/discussion/2002_1.pdf).
- Eilat, Y., Einav, L., (2004), "Determinants of international tourism: A three-dimension panel data analysis", *Applied Economics*, 36-12: 1315-1327.
- Garín-Muñoz, T., Amaral, T.P., (2000), "An econometric model for international tourism flows to Spain", *Applied Economics Letters*, 7: 525-529.
- Garín-Muñoz, T., Montero-Martin, L.F., (2007), "Tourism in the Balearic Islands: A dynamic model for international demand using panel data", *Tourism Management*, 28-5: 1224-1235.
- Garín-Muñoz, T., (2009), "Tourism in Galicia: domestic and foreign demand", *Tourism Economics*, 15-4: 753-769.
- Gil-Alana, L.A., Fischer, C., (2007), "International traveling and trade: further evidence for the case of Spanish wine based on fractional VAR specifications", Contributed Paper prepared for presentation at the 105th EAAE Seminar 'International Marketing and International Trade of Quality Food Products', Bologna, Italy, [http://www.bean-quorum.net/EAAE/pdf/EAAE105\\_Paper072.pdf](http://www.bean-quorum.net/EAAE/pdf/EAAE105_Paper072.pdf).
- Habibi, F., Rahim, K.A., Ramchandran, S., Chin, L., (2009), "Dynamic model for International Tourism Demand for Malaysia: Panel Data Evidence", *International Research Journal of Finance and Economics*, 33: 207-217.
- Hanafiah, M.H.M., Harun, M.F.M., (2010), "Tourism demand in Malaysia: A cross-sectional pool time-series analysis", *International Journal of Trade, Economics, and Finance*, 1-1: 80-83.
- Kareem, O.I., (2007), "A Panel Data Analysis of Demand for Tourism in Africa", A Paper Presented at the 12<sup>th</sup> Africa Econometric Society (AES) Annual conference, Cape Town, South Africa.
- Law, R., Au, N., (1999), "A neural network model to forecast Japanese demand for travel to Hong Kong", *Tourism Management*, 20: 89-97.
- Leitão, N.C., (2009), "Portuguese tourism demand", *Journal of Global Business and Technology*, 5-2: 63-72.
- Leitão, N.C., (2010), "Does trade help to explain tourism demand? The case of Portugal", *Theoretical and Applied Economics*, XVII-544: 63-74, <http://www.ectap.ro/articole/451.pdf>.
- Li, G., Song, H., Witt, S., (2005), "Recent Developments in Econometric Modeling and

- Forecasting”, *Journal of Travel Research*, 44-1: 82-99.
- Lim, Ch., McAleer, M., (2001), “Cointegration analysis of quarterly tourism demand by Hong Kong and Singapore for Australia”, *Applied Economics*, 33: 1599-1619.
- Lim, C., (1997), “Review of international tourism demand models”, *Annals of Tourism Research*, 24-4: 835-849.
- Luzzi, G.F., Fluckiger, Y., (2003), “An econometric estimation of the demand for tourism: The Case of Switzerland”, *Pacific Economic Review*, 8-3: 289-303, Blackwell Publishers Ltd (a Blackwell Publishing Company).
- Maloney, W.F., Rojas, G.M., (2005), “How elastic are sea, sand and sun? Dynamic panel estimates of the demand for tourism”, *Applied Economics Letters*, 12: 277-280.
- Mervar, A., Payne, J.E., (2007), “Analysis of Foreign Tourism Demand for Croatian Destinations: Long-Run Elasticity Estimates”, *Tourism Economics*, 13-3: 407-420.
- Morley, C.L., (1993), “Forecasting tourism demand using extrapolative time series methods”, *The Journal of Tourism Studies*, 14-1: 19-25.
- Muhammad, A., Andrews, D., (2008), “Determining Tourist Arrivals in Uganda: The Impact of Distance, Trade and Origin-Specific Factors”, *African Journal of Accounting, Economics, Finance and Banking Research*, 2-2: 51-62.
- Naudé, W., Saayman, A., (2005), “Determinants of Tourists Arrivals in Africa: A Panel Data Regression Analysis”, *Tourism Economics*, 11-3: 365-391.
- Nordström, J., (2005), “Dynamic and stochastic structures in tourism demand modeling”, *Empirical Economics*, 30: 379-392.
- Pender, L., Sharpley, R., (2005), *The Management of Tourism*, SAGE Publications.
- Phakdisoth, L., Kim, D., (2007), “The determinants of inbound tourism in Laos”, *ASEAN Economic Bulletin*, 24-2: 225-237.
- Santana-Gallego, M., Ledesma-Rodríguez, F., Pérez-Rodríguez, J.V., (2009), “Tourism and trade in OECD countries. A dynamic heterogeneous panel data analysis”, [http://www.ub.edu/jei/papers/SANTANA\\_GALLEGO-CORTES\\_JIMENEZ.pdf](http://www.ub.edu/jei/papers/SANTANA_GALLEGO-CORTES_JIMENEZ.pdf).
- Seetanah, B., (2006), “Analysing Transport Capital as a Determinant of Tourist Arrival in a Co-integration and Error Correction Framework”, *International Review of Business Research Papers*, 2-2: 15-29.
- Sharpley, R., Telfer, D., (2002), *Tourism and development: Concepts and Issues*, Cambrian Printers Ltd.
- Shan, J., Wilson, K., (2001), “Causality between trade and tourism: empirical evidence from China”, *Applied Economics Letters*, 8: 279-283.
- Sinclair, M.T., Tsegaye, A., (1990), “International tourism and export instability”, *Journal of Development Studies*, 26-3: 487 – 504.
- Sinclair, M.T., (1998), “Tourism and Economic Development: A Survey”, *The Journal of Development Studies*, 34-5:1-51.
- Song, H., Witt, S.F., (2000), *Tourism Demand Modelling and Forecasting: Modern Econometric Approaches*, Advances in Tourism Research Series, Pergamon, Oxford.
- Song, H., Witt, S.F., (2003), “Tourism Forecasting: The General-to-Specific Approach”, *Journal of Travel Research*, 42: 65-74.
- Song, H., Fei, B., (2007), “Modelling and forecasting international tourist arrivals to mainland China”, *China Tourism Research*, 3-1: 20-40.
- Song, H., Witt, S.F., Li, G., (2008), *The advanced econometrics of tourism demand*, Taylor & Francis E-Library.
- Soukiazis, E., Proença, S., (2008), “Tourism as an alternative source of regional growth in Portugal: a panel data analysis at NUTS II and III levels”, *Portuguese Economic Journal*, 7: 43-61.
- Taylor, T., Ortiz, R., (2009), “Impacts of climate change on domestic tourism in the UK: a

- panel data estimation", *Tourism Economics*, 15-4: 803–812.
- Turner, L.W., Witt, S.F., (2001), "Factors influencing demand for international tourism: tourism demand analysis using structural equation modelling", *Tourism Economics*, 7-1: 21-38(18).
- Vanegas, Sr. M., (2009), "Tourism Demand Response by Residents of Latin American Countries", *International Journal of Tourism Research*, 11: 17-29.
- Wahab, S., Pigram, J.J., (1997), *Tourism, development and growth*, Routledge.
- World Travel and Tourism Council, (2008), *The 2008 Travel & Tourism Economic Research: European Union, Travel&Tourism-The Winds of Change*.
- Zortuk, M., (2009), "Economic Impact of Tourism on Turkey's Economy: Evidence from Cointegration Tests", *International Research Journal of Finance and Economics*, 25: 231-239.
- ec.europa.eu/eurostat.
- <http://www.cepii.fr/anglaisgraph/bdd/bdd.htm>.
- [www.worldbank.org/](http://www.worldbank.org/).
- [www.insse.ro](http://www.insse.ro).

## MODELIRANJE PANEL PODATAKA MEĐUNARODNE TURISTIČKE POTRAŽNJE: SLUČAJ RUMUNJSKE

### SAŽETAK

*Rad analizira odrednice međunarodne turističke potražnje za Rumunjskom i kvantificira njihov utjecaj. Autori obrađuju dva modela, model fiksnih efekata i Tobit model, kako bi procijenili podatke o priljevu turista iz dvadeset i tri europske zemlje u periodu od 1997 do 2008. U statičkom panelnom modelu fiksnih efekata nalazimo da su BDP per capita, bilateralna trgovina, stanovništvo i cijene glavne odrednice turističkih tokova prema Rumunjskoj. Za Tobit model, sve u obzir uzete varijable, BDP per capita, bilateralna trgovina, stanovništvo, geografska udaljenost i cijene, utječu na međunarodnu turističku potražnju. Oba modela upućuju na to da su trgovina, stanovništvo i prihod važnije odrednice nego relativne cijene i geografska udaljenost Rumunjske od ishodišnih zemalja.*

**Ključne riječi:** međunarodna potražnja, turistički dolasci, model za panelne podatke, trgovina, Rumunjska