THE RELATIONSHIP BETWEEN TOURIST ARRIVALS AND ACCOMODATION IN ROMANIAN REGIONS. A PANEL DATA APPROACH

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Abstract
This research is a novelty for the literature regarding tourism demand modeling in Romania. Panel data approach has been applied to analyze the relationship between tourist arrivals and the establishments of tourists' reception with functions of tourists' accommodation in the eight Romanian regions (Nord-West region, Central region, Nord-East region, South-East region, South-Muntenia region, Bucharest-Ilfov region, South-West Oltenia and West regions). According to panel VAR Granger causality test, the establishments of tourists' reception with functions of tourists' accommodation are a cause for tourist arrivals, but the relationship is not reciprocal. A valid fixed effects model was built and an increase in the number of establishments of tourists' reception with functions of tourists' accommodation with one establishment increased in average the number of tourist arrivals with around 293 people in Romanian regions over the period 1990-2015. According to panel vector-autoregressive model, the tourist arrivals in the current period were positively influenced by the establishments of tourists' reception with functions of tourists' accommodation and tourist arrivals in the previous period.

Key words: *tourist arrivals, accommodation, panel data, Granger causality*

JEL Classification: *C23, C51.*

I. INTRODUCTION

Tourism demand modelling is one of the most important domains in tourism research, a considerable attention being given by practitioners and academic in the last ten years. The research in tourism demand modelling is based on secondary data concerning the estimation process.

The empirical research in tourism from economic point of view is related to five main areas:

- Economic influence of international tourism or/and domestic tourism on the national economy (Saayman, Saayman et al., 2000; Vaughan, Farr et al., 2000, Pratt, 2015);
- Tourism as factor of economic development (Saayman, Saayman et al., 2001, Cárdenas-García, Sánchez-Rivero et al., 2015);
- Economic influence of certain known events (Gelan, 2003) and facilities (Chen and Hsu, 2001);
- Modeling and incorporate the international touristic flows or tourism demand (Eilat and Einav, 2003; Divisekera, 2003, Tang and Tan, 2015);
- Predicting tourism demand (Frechtling, 2012, Akin, 2015, Cankurt and Subasi, 2015).

In this study, the main aim is to identify the relationship between tourism demand and touristic accommodation using panel data approach. The cross-sections are represented by the eight regions from Romania (Nord-West region, Central region, Nord-East region, South-East region, South-Muntenia region, Bucharest-Ilfov region, South-West Oltenia and West regions). The analysis is conducted in the period 1990-2015.

The main results showed that touristic arrivals at regional level in Romania are determined by the touristic structures that provide attractive offers to lure customers. It seems that more arrivals in the previous year do not encourage entrepreneurs to immediately offer more buildings for accommodation. On the other hand, the construction of these buildings and the obtaining the attestation take enough time which can be more than a year. The panel vector-autoregressive approach put into evidence the positive impact of tourist arrivals and of *establishments* of *tourists*' *reception* with *functions* of *tourists' accommodation in the previous year to the tourist arrivals in the current year.*

After this introduction, the paper presents a theoretical background from literature regarding tourist demand modeling. The empirical application uses data for the eight Romanian regions and the relationship between tourist arrivals and accommodation is studies from panel data perspective. The last part of the articles concludes.

II.MODELLING TOURIST DEMAND IN LITERATURE

Methods for tourism demand modelling are placed into two major categories: qualitative and quantitative methods. Most of the studies used quantitative methods to analyze and predict the tourist demand (Song and Turner, 2006).

Song and Li (2008) made a consistent review of papers on tourist demand modeling and forecasting after 2000. Time series approach and econometric modeling remain the most powerful quantitative tools for analyzing tourist demand. Recent issues in this field are related to the evaluation of crisis effect on tourist demand and seasonality and tourist cycles analysis.

Naudé and Saayman (2005) identified two groups of methods for estimating the tourist arrivals:

- Models based on non-causal relationship, mostly time series models;
- Econometric methods based on causal relationship.

According to Chu (2004), causal models are designed to detect and measure the economic and noneconomic factors that determine other variables like price and quantity. On the other hand, time series models detect the presence of stochastic components (like moving average component or autoregressive element) in any time series. Box–Jenkins approach and exponential smoothing are examples of non-causal techniques used by Lim and McAleer (2001) and Chu (1998). These non-causal models are suitable for tourism demand forecasting. The major disadvantage is that they are not based on an economic theory and cannot be employed in policy framework. Therefore, more researchers prefer the causal models that allow the evaluation of changes in tourism arrivals when one or more factors modify.

For estimating tourist demand various types of non-causal models have been proposed: multivariate regression in the context of price-independent generalized log-linear utility function (Divisekera, 2003), cointegration techniques like error correction models (Kulendran and Witt, 2001), autoregressive distributed lag model (ARDL) for capturing dynamics in economic sectors (Song, Witt *et al,* 2003). The regional determinants of tourism arrivals were identified by Eilat and Einav (2003) by using panel data techniques like pooled logit models.

Naudé and Saayman (2005) identified the determinants of tourism arrivals during 1996-2000 in 43 countries from Africa: destination's development level, political stability, infrastructure and marketing.

The most used measure of tourism demand is represented by tourist arrivals which are evaluated as total number of tourist arrivals from origin place to a certain destination. The variable can be decomposed into more components like business tourist arrivals, holiday tourist arrivals and arrivals for visiting relatives and friends (Kulendran and Wong, 2005). Other proxy variables for tourism demand are: tourism revenues, tourist expenditure in the destination place, tourism export, tourism import, and tourism employment.

Generalised Autoregressive Conditional Heteroskedastic (GARCH) model was utilized for modeling tourism demand using time series. Chan, Lim *et al* (2005) used three multivariate GARCH models to study the tourism demand volatility and the consequences of different shocks in the tourism demand. The results showed that tourism demand was influenced by the model conditional variances where demand for Australian tourism is linked by four leading tourism source markets.

By using causal econometric models policy recommendations might be provided and the effectiveness of current tourism policies might be assessed. The inter-correlated relationships between tourism demand and various factors represent major concerns of governments and businesses.

An important development of the structural modelling in the tourism context is shown in Li *et al* (2006), who combined the time varying parameters model (TVP) with error correction model (ECM model) to obtain TVP-ECM model.

Wong, Song *et al* (2006) proposed three Bayesian VAR (BVAR) models by choosing various priors. The forecasts based on these Bayesian models have improved the accuracy of traditional econometric models. Almost ideal demand system (AIDS) was recently applied in tourism demand analysis in certain neighbouring destinations. AIDS method is better than single-equation approach in terms of elasticity for studying complementary and substitution effects.

De Mello and Fortuna (2005) and Mangion, Durbarry *et al* (2005) mixed an ECM with a linear AIDS model. Li, Wong *et al* (2006) combined a TVP model along with a long-run LAIDS and with EC-LAIDS to obtain TVP-LR-AIDS and TVP-EC-LAIDS processes.

Panel data models were successfully applied in the context of tourism demand. This type of model diminishes the disadvantage of multicollinearity and it ensures more degrees of freedom in the estimation process. For small time series, it is useful for modeling and forecasting the tourism demand. Naudé and Saayman (2005) used the panel data models to analyze the demand for tourism in a number of 43 African countries and Roget and González (2006) studied the rural tourism demand in Galicia.

The main determinants of tourism demand in Tunisia were identified by Gasmi and Sassi (2015) using a dynamic panel model in the period 1994-2012. The results showed that client loyalty is the main determinant of foreign demand in tourism in this

country. The tourism in Tunisia could be promoted if improvements are made in air supply and capacity of accommodation.

The panel data approach was also employed by Leitão (2015) who modeled the tourism demand in Portugal. The main determinants of tourism demand in Portugal are: income, bilateral trade, geographical distance between Portugal and origin country and border. The dynamic panel is most suitable for modeling tourism demand than statistic approaches.

Hernández-López and Cáceres-Hernández, (2007) showed that genetic algorithms (GA) are useful in explaining changes observed in the tourism demand. Support vector machine (SVM) might be used in nonlinear regression estimation and classification. A genetic algorithm in SVM approach was described by Pai, Hong *et al* (2006) for modeling and predicting the tourism demand in Barbados.

III.MODELLING TOURIST ARRIVALS IN ROMANIAN REGIONS

The variables used in this analysis are represented by tourist arrivals and *establishments* of *tourists*' *reception* with *functions* of *tourists' accommodation. The tourist arrivals are the proxy for tourism demand. The establishments* of *tourists*' *reception* with *functions* of *tourists' accommodation are represented by any building that seasonally or permanent provides accommodation and other types of services for tourists. If the capacity is less than 5 places, the statistical research excludes this from this category of establishments.*

The variables are registered for the eight regions of Romania over the period 1990-2015: Nord-West region, Central region, Nord-East region, South-East region, South-Muntenia region, Bucharest-Ilfov region, South-West Oltenia and West regions.

The source of data is represented by the Statistical Research regarding the capacity of tourist accommodation of individuals and companies.

The panel data approach is applied in this case to study the relationship between the two variables. The presence of unit root is checked using Im-Pesaran-Shin test at a significance level of 5%. The null hypothesis states that all panels contain unit roots. The test statistic for tourist arrivals is -4.2447 and the associated probability is 0.00, fact that suggests the rejection of the null hypothesis. For the *establishments* of *tourists*' *reception*, *the* test statistic for tourist arrivals is -4.045 and the associated probability is 0.00, fact that shows the rejection of the null hypothesis. So, some panels are stationary for both variables at a significance level of 5% (see results in Appendix A).

The panel VAR- Granger causality test is applied to identify the causality between variables.

Table 1. The panel VAR Granger causality Wald test

Hypothesis	Chi-squared	Degrees of freedom	Prob.>chi-squared
Tourist arrivals does not Granger cause establishments	0.572	1	0.449
Establishments does not Granger cause Tourist arrivals	24.68	1	0.000

The results of Granger test indicated that the *establishments* of *tourists*' *reception* are a cause for tourist arrivals, but the relationship is not bi-directional. The increase in tourist arrivals does not determine an increase in the supply of tourist establishments.

A fixed effects and a random effects model are estimated to explain the tourist arrivals using establishments as explanatory variable.

Table 2. A fixed effects model for explaining tourist arrivals in Romanian regions

Variable	Coefficient	t-calculated	Prob.>|t|
establishments	293.274	3.24	0.001
constant	705050.7	14.26	0.000

For fixed effects model, 67.66% of the overall variation is explained by the differences between regions. The model is valid, the coefficients being statistically significant. For this model, the errors are homoskedastic. Modified Wald test for groupwise heteroskedasticity in fixed effect regression model was applied. For this test, the null hypothesis states the constant variance. The value of chi-squared statistic is 15 and the associated probability is 0.0592, which is greater than 0.05. Therefore, we do not have evidence to reject the null hypothesis.

An increase in the number of establishments of *tourists*' *reception* with *functions* of *tourists' accommodation with one establishment increased in average the number of tourist arrivals with around 293 people in Romanian regions over the period 1990-2015.*

Table 3. A random effects model for explaining tourist arrivals in Romanian regions

Variable	Coefficient	t-calculated	Prob.>|t|
establishments	363.006	4.46	0.000
constant	669379.1	9.13	0.000

A random effects model was also estimated, but the Hausmann test indicated that the fixed effects model is better.

A panel vector- autoregressive model was also estimated to check if the values in the previous periods of these variables affect the current values.

Table 4. A panel vector- autoregressive

Variable	Coefficient	z-calculated	Prob.>|z|
establishments (t)= dependent variable			
establishments (t-1)	0.9403	2.40	0.017
arrivals (t-1)	0.00010	0.76	0.449
arrivals (t)= dependent variable			
establishments (t-1)	273.903	4.97	0.000
arrivals (t-1)	0.2840	5.01	0.000

The panel VAR model satisfies the stability condition. All the eigenvalues lie inside the unit circle.

Table 5. Eigenvalue stability condition

Eigenvalue		
Real	**Imaginary**	**Modulus**
0.9814647	0	0.9814647
0.2429451	0	0.2429451

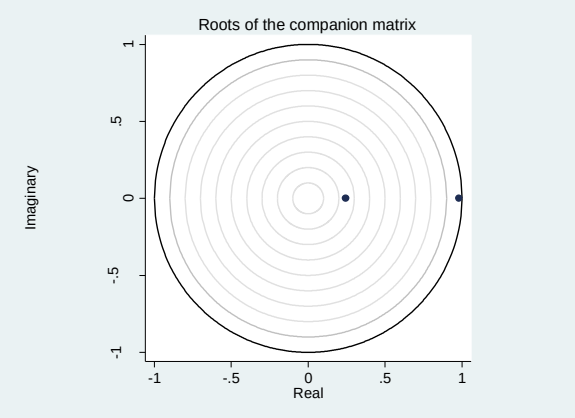

Figure 1: Eigenvalue stability condition

The first equation of panel VAR model indicated that the number of establishments is not fixed according to tourist arrivals evolution in the previous period.

On the other hand, the tourist arrivals in current period depends on the arrivals in the previous period and on the establishments of *tourists*' *reception* with *functions* of *tourists' accommodation in the previous period. The relationships between these variables are positive. If the number of tourist arrivals increased with ten people in the previous year, the number of arrivals in the next year will increase, in average, with almost 3 arrivals. If the number of establishments* of *tourists*' *reception* with *functions* of *tourists' accommodation increased in the previous year with one unit, the tourist arrivals will increase, in average, in the next year with almost 274 arrivals. So, the number of establishments plays a more important role in attracting tourists than the number of arrivals in the previous year.*

IV. CONCLUSIONS

There are many studies regarding tourism demand modeling, which has a major importance in decision-making, planning and the monitoring of tourism control. Even if panel data approach has many advantages for tourism demand modeling, there are few studies in this domain.

A panel data analysis was made for Romanian regions over the period 1990-2015. The results indicated that touristic arrivals at regional level in Romania are determined by the touristic structures that provide attractive offers to lure customers. It seems that more arrivals in the previous year do not encourage entrepreneurs to immediately offer more buildings for accommodation. The number of tourist arrivals from previous year and the establishments of *tourists*' *reception* with *functions* of *tourists' accommodation in the previous year influence the current tourist arrivals in Romania.* The fixed effects model showed that there are specific latent factors in each region that are correlated with the establishments of *tourists*' *reception* with *functions* of *tourists' accommodation.*

This type of research is a novelty from Romanian literature regarding tourism demand modeling. However, it would be interesting to make analysis at national level by taking the total levels of the variables.

APPENDIX A

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. xtunitroot ips structure

Im-Pesaran-Shin unit-root test for structure
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Ho: All panels contain unit roots        Number of panels =     26
Ha: Some panels are stationary           Number of periods =     8

AR parameter: Panel-specific             Asymptotics: T,N -> Infinity
Panel means:  Included                                sequentially
Time trend:   Not included

ADF regressions: No lags included
------------------------------------------------------------------------------
                                                 Fixed-N exact critical values
                     Statistic      p-value        1%      5%      10%
------------------------------------------------------------------------------
t-bar                 -2.3967                    -1.850  -1.750  -1.700
t-tilde-bar           -1.7783
Z-t-tilde-bar         -4.0450       0.0000
------------------------------------------------------------------------------
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. xtunitroot ips arrivals

Im-Pesaran-Shin unit-root test for arrivals
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Ho: All panels contain unit roots         Number of panels =     26
Ha: Some panels are stationary            Number of periods =     8

AR parameter: Panel-specific              Asymptotics: T,N -> Infinity
Panel means:  Included                                 sequentially
Time trend:   Not included

ADF regressions: No lags included
------------------------------------------------------------------------------
                                                 Fixed-N exact critical values
                 Statistic      p-value        1%      5%      10%
------------------------------------------------------------------------------
t-bar             -2.6050                    -1.850  -1.750  -1.700
t-tilde-bar       -1.8062
Z-t-tilde-bar     -4.2447        0.0000
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