THE POPULATION EMPLOYED AND TOURISM FLOWS IN ROMANIA'S REGIONAL ECONOMIC RECOVERY. A COINTEGRATION ANALYSIS

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Abstract
Starting from the role of tourism in sustainable economic development, the paper analyzes the existence of co integration relations between GDP, the employed population in hotels and restaurants and the number of tourists' arrivals in the tourist accommodation structures in Romania by development regions. Taking into account that the analysis aims at identifying stable long-term relations between the analyzed variables, we consider that the gap between the current study period and the availability of the data series in the official statistics does not have a significant influence on the conclusions of the paper. The main conclusion of the paper is the existence of a co integration relationship between the analyzed variables which highlights the significant role of the arrivals flow in the tourist reception structures both on the employed population and on the regional level.

Key words: *tourist arrivals, employed population, GDP, regional development, VEC model.*

JEL Classification: *L83, E24, J21.*

I. INTRODUCTION

Tourism is considered a creator of new jobs. Thus, as presented in the work "Globalization and its impact on the tourism-labor relations" (Gogonea, Zaharia et.al, 2007), the tourism-labor relationship can be seen both from the perspective of the employed population and from the point of view of a link between tourism contribution to GDP formation and number of tourism workers, targeting both economic impact: direct and indirect, with regional particularities (Chirtoc, 2017), but also with similarities at national level (Zorzoliu, 2016).

Considering that tourism-specific activities and operations are subject to the automation and technicalization process at a much lower rate than in other areas of activity, this sector has a particular capacity to capture the surplus living labor in the other branches and sectors of activity, it can be summarized that tourism is designated as the largest consumer of workforce, implicitly creating new jobs.

Starting from the fact that both today and in the future, tourism is one of the most important industries and one of the engines of economic and social development (Neacsu and Neacsu, 2012), the modeling of the interaction between the variables of tourism (arrivals and employment population in tourism) and the economic growth reflection (Gross Domestic Product corresponding to the contribution of the activity in hotels and restaurants) as a result of the involvement of tourism in regional economic development, has in view to establish the causal relationship between them starting from the level of the regional structures.

The data series underlying the study are arrivals in the establishments of tourists, employment in tourism and GDP of hotels and restaurants in the eight development regions of Romania (North-West, Central, North East, South-East, South-Muntenia, Bucharest-Ilfov, South-West, West) during 2000-2016 (NIS, 2019).

Taking into account that the population employed in the hospitality industry, the gross domestic product in tourism, as well as the flows of tourists are variables in intercondition relations, being equally exogenous and endogenous variables, a possibility of analysis is the analysis of integration, with its advantages and disadvantages Moosa (2017), respectively, vector autoregressive (VAR) models, and vector error correction (VEC) models. Among the uses of the co integration analysis in the study of tourism we mention the studies of Pepi (2014) and Andraz (2015) based on VAR models, as well as the studies of Mester (2009) and Schubert, Juan and Risso (2011), based on VEC models.

In this context, the study aims at identifying an econometric model based on the co integration analysis through the data taken from official documents and sites on the mentioned indicators, for the period 2000-2016 (GDP projected for 2016) and Romania's economic development regions.

II. RESEARCH METHODOLOGY

Cointegration involves the existence of a linear stationary combination between endogenous variables that highlights the existence of a common non-stationary dynamics. Identification and testing of co integration relationships between two or more endogenous variables involves the development of VAR models and from them to VEC models.

The general form of a VAR model is:

$$y_t = \sum_{i=1}^{p} A_i \cdot y_{t-i} + B \cdot x_t + \varepsilon_t \qquad (1)$$

where y_t is a vector of *k* endogenous variables, x_t is a vector of *m* exogenous variables, and $A_i \in R^{k \times p}$, $B \in R^{k \times m}$ are matrices of coefficients to be estimated.

VEC models are derived from VAR models by incorporating co integration relationships, a term called *error correction term* (ECT).

One of the general shapes of VEC models is:

$$\Delta y_t = \beta \cdot ECT_{t-1}^{y} + \sum_{i=1}^{p} A_i \cdot \Delta y_{t-i} + u_t \qquad (2)$$

In (2) $\Delta y_t = y_t - y_{t-1}$ is a vector of *k* endogenous variables, $A_i \in R^{k \times p}$ are matrices of coefficients to be estimated and $\beta \in R^k$ is the vector of coefficients of ECT.

Testing the existence of co integration relationships is based on the two-stage Engle-Granger algorithm. The first step includes the initial testing of the variable integration order (the series must be first order integrated). Studying and testing the existence of a unit root in the series and in the differentiated series of variables takes into account the null hypothesis: Unit root (assuming common unit root process). In the second stage we estimate the long-term linear relationship by applying the Johansen Test (Simionescu, 2014).

Usually, the significance threshold is 5% (95% Confidence level). In some situations 90% Confidence level was used in the testing of statistical hypotheses.

III. RESULTS AND DISCUSSIONS

During the analyzed period, in all eight development regions of Romania, both Employed population in tourism (ETP), number of arrivals in the tourist reception structures (ATRS) and Gross domestic product at regional level (GDP), expressed in prices comparable, had upward trends. Thus, the evolution indicators of the three indicators included in the analysis (Fig.1) evolved between 143.6% and 201.5% for the Employed population in tourism, between 137.4% and 355.9% for Arrivals in the tourist reception structures and between 175.6% and 235.2% for Gross domestic product.

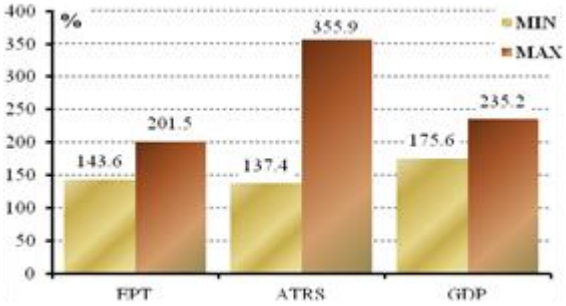

Figure 1 – The indices of Employees in tourism (ETP), Number of arrivals in the tourism reception structures (ATRS), and Gross domestic product (GDP) at regional level between, 2000 and 2015. Source: own elaboration using NIS's data series

One of the factors of the tourism industry, which contributes decisively to Romania's economic growth, is the intensity of the tourists arriving in the tourist reception facilities. In the first two thirds of the analyzed period, the intensity of these flows increased rather slowly (Fig.2) and approximately at the same rhythm in all eight development regions. At the same time, there was a relative decline during the economic crisis.

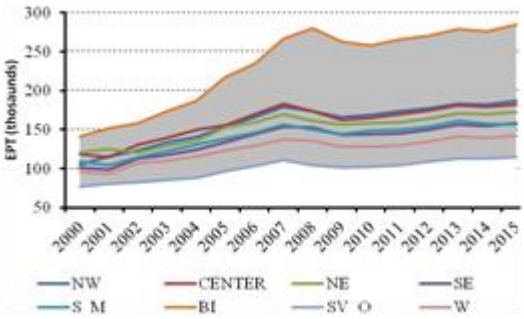

Figure 2 – The evolutions of Number of arrivals in the tourism reception structures in Romania's development regions: North-West (NE), Center, North-East (NE), South-East (SE), South Muntenia (S_M), Bucuresti-Ilfov (BI), South-West Oltenia (SV_O) and West. Source: own elaboration using NIS's data series

After 2010 there are quite strong discrepancies between the intensity of tourist flows in the development regions. The largest increase of Arrivals in the tourist reception structures, of 1,205,474 tourists, was registered in the development area Center (a growth of 2.07 times), followed by Bucharest-Ilfov region, of 725,644 tourists (a growth of 1.64 times). The South-West Oltenia region was at the opposite end, the evolution of the tourist flow in this region being

highlighted by the lower limit of the area of Arrivals in the tourist reception structures in Fig.2.

In order to ensure the highest quality service, the increase in the intensity of tourist flows should be followed by an increase in the number of Employed population in tourism. Unlike the developments of the Arrivals in the tourist reception structures, the evolution of the Employed population in tourism recorded significant increases in the period preceding the economic-financial crisis (Fig. 3) and a slow increase in 2010-2015.

Thus, if in 2000-2002 Employed population in tourism increased by 1.98 times in Bucharest-Ilfov region and 1.41 times in North-East region and West region, during the period 2010-2015 there was an increase of approximately 1.1 times in each of the eight Romania's development regions.

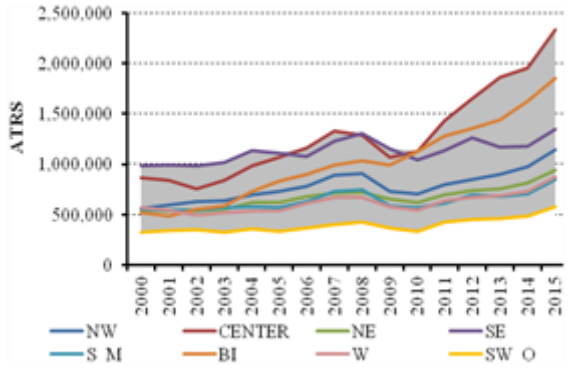

Figure 3 – The evolutions of number of Arrivals in the tourism reception structures in Romania's development regions. Source: own elaboration using NIS's data series

It should be noted that unlike the other seven development regions in Romania, in the Bucharest-Ilfov development region, the number of Employed population in tourism is more than 1.5 times higher than in the North-West region and 2.4 times higher than in South-West Oltenia region.

However, by reporting the number of Arrivals in the tourist reception to the number of Employed population in tourism, for the year 2000, there were values between 3.69 tourists per employed in tourism in Bucharest-Ilfov and 9.63 tourists per employed in tourism in the Center region. In 2015, in seven of the eight development regions, the values ranged between 5.07 tourists per employed in tourism in the South-West Oltenia region and 8.52 tourists per employed in tourism in the South-East region. A significantly different value was recorded in the Center region (12.81 tourists per employed).

A first conclusion that emerges from this analysis is that although at the level of the eight development regions in Romania there are apparently differences regarding the Arrivals in the tourism reception structures, Employed population in tourism and Gross domestic product from tourism, there is a possibility of a general trend on long term between the three indicators analyzed.

In order to verify this assumption, respectively to test the existence of co integration relationships between the three variables included in the analysis, a VAR model (1) and, based on it, a VEC models of type (2) were developed and tested.

A first condition for the existence and stability of a VAR model is to verify the existence of the unit root at the first difference of analyzed variables. The results obtained from the Augmented Dickey-Fuller statistical test are presented in Table 1.

Table 1. Results of Augmented Dickey-Fuller test for GDP, EPT and ATRS

Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
Null Hypothesis:	D(GDP) has a unit root	-11.41481	0.0000
	D(EPT) has a unit root	-10.92797	0.0000
	D(ATRS) has a unit root	-12.37064	0.0000
Test critical values:	1% level	-3.482879	
	5% level	-2.884477	
	10% level	-2.579080	

*MacKinnon (1996) one-sided p-values.

Source: own elaboration using EViews

Taking into account that the null hypothesis (H_0) of the Augmented Dickey-Fuller test is: the test data series has a unit root, and that the absolute values of t-Statistic are higher than the absolute values for the 5% level, and for the 1% level for all the first difference of analyzed variables, it follows that the null hypothesis is rejected and therefore the alternative hypothesis (H_1) is accepted for all variables analyzed: have no unit roots. The same conclusion is obtained by analyzing the Prob = 0.0000 <α = 0.05.

Starting from the conclusions of the Augmented Dickey-Fuller test, the lag order of VAR was chosen (Table 2)

Table 2. Results of analyzed of lag order of VAR

VAR Lag Order Selection Criteria
Endogenous variables: GDP ETP ATRS
Exogenous variables: C

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.16e+21	57.01331	57.08299	57.04161
1	377.4633	5.19e+19	53.90931	54.18806*	54.02251
2	9.781838	5.53e+19	53.97275	54.46056	54.17085
3	53.07115	3.97e+19	53.64028	54.33715	53.92328
4	14.57057	4.03e+19	53.65411	54.56004	54.02201
5	38.41440*	3.24e+19*	53.43474*	54.54974	53.88754*
6	5.911013	3.57e+19	53.52621	54.85027	54.06392

***** indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion

Source: own elaboration using EViews

Given that, except for the Schwarz information criterion, the other criteria recommend a Lag = 5, and that the order of differentiation is 1, was a VAR model of the form:

$$GDP_t = \sum_{i=1}^{6} a_{1i} \cdot GDP_{t-i} + \sum_{i=1}^{6} a_{2i} \cdot ETP_{t-i} + \sum_{i=1}^{6} a_{3i} \cdot ATRS_{t-i} + C \quad (3)$$

For this model all roots of AR polynomial characteristic are included in the unit circle (Fig. 4), which means that the model (3) is stable.

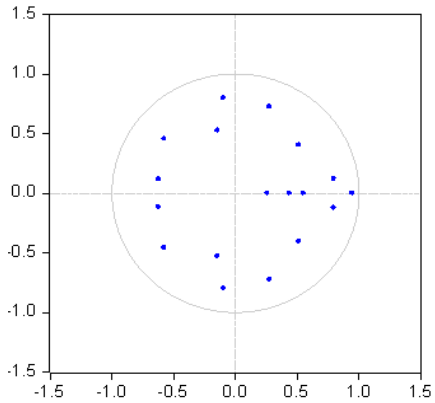

Figure 4 – Inverse Roots of AR, model (3), characteristic polynomial. Source: own elaboration using EViews

Starting from this model, the possibility of VEC models was tested. The results of the Johansen co integration test are shown in Table 3.

Table 3. Results of Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Trend assumption: No deterministic trend
Series: GDP ETP ATRS

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.145580	30.21217	24.27596	0.0080
At most 1	0.079295	10.86034	12.32090	0.0868
At most 2	0.005663	0.698559	4.129906	0.4624

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.145580	19.35184	17.79730	0.0290
At most 1	0.079295	10.16178	11.22480	0.0764
At most 2	0.005663	0.698559	4.129906	0.4624

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: own elaboration using EViews

Since the null hypothesis (H_0) of the Unrestricted Cointegration Rank Test is: no cointegrating eqn(s), and considering that Trace Statistic and Max-Eigen Statistical values are higher than the corresponding Critical Values, it results that it is rejected the null hypothesis and, consequently, it is accepted the hypothesis (H_1) of the existence of a co integration relationship between the analyzed variables.

The identified VEC model is no intercept or trend in the CE type:

$$D(GDP) = \beta \cdot ECT_{t-1} + \sum_{i=1}^{6} a_{1i} \cdot D(GDP_{t-i}) + \\ + \sum_{i=1}^{6} a_{2i} \cdot D(ETP_{t-i}) + \sum_{i=1}^{6} a_{3i} \cdot D(ATRS_{t-i}) \quad (4)$$

In ECT_{t-1} term, the values of the coefficients of the analyzed variables as well as their statistical significance are presented in Table 4.

Table 4. The estimation of VEC coefficients and their Standard errors and t-statistics values

Vector Error Correction Estimates
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
GDP(-1)	1.000000
EPT(-1)	-94.89173 (13.4878) [-7.03536]
ATRS(-1)	-0.007013 (0.00240) [-2.91996]
Error Correction:	**D(PIB)**
CointEq1	-0.215081 (0.11195) [-2.92119]
R-squared	0.466637
Adj. R-squared	0.408452

Source: own elaboration using EViews

The t-statistic values corresponding to the coefficients of the ECT_{t-1} model as well as of the CointEq1 highlight that both the VEC model and the coefficients of its variables are statistically significant.

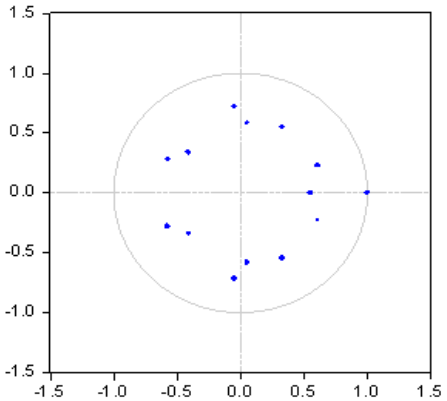

Figure 5 – Inverse Roots of AR characteristic polynomial. Source: own elaboration using EViews

Also all roots of AR polynomial characteristic are included in the unit circle (Fig. 5), which means that the model is stable.

To verify the dynamic behavior of the VEC model, whose characteristics are presented in Table 4, a unit impulse (Cholesky -dof adjusted method) was applied, the results obtained being shown in Fig. 6.

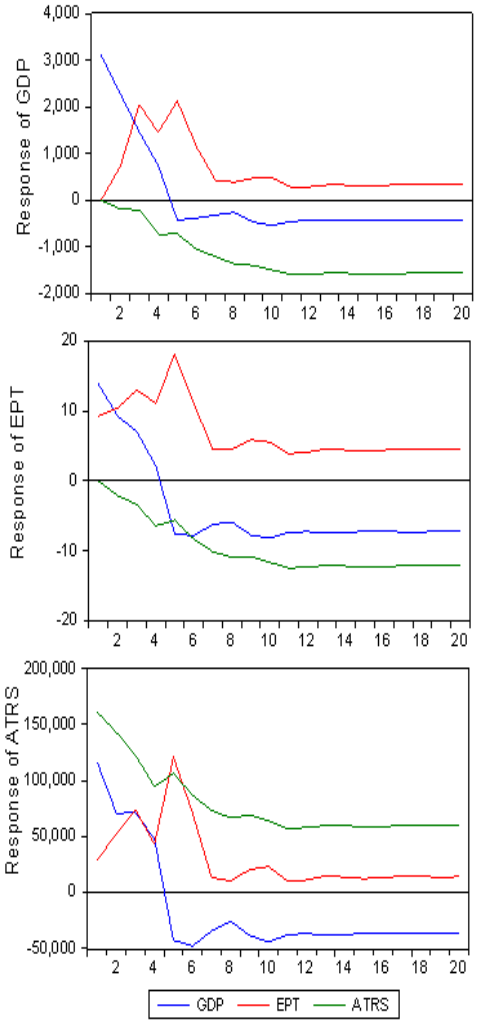

Figure 6 – Response of GDP, EPT and ATRS to Cholesky One S.D. Innovations. Source: own elaboration using EViews

Taking into account the results obtained from apical tests, the identified VEC model reveals a long-term interdependence relationship between Employed population in tourism, number of Arrivals in the tourist reception structures and Gross domestic product in tourism industry at regional level.

The co integration relationship is:

$$GDP = 94.89173 \cdot ETP + 0.007013 \cdot ATRS \quad (5)$$

The model (5) highlights the long-term stable relationship between the three variables analyzed, indicating that both the Employed population in tourism and the number of Arrivals in the tourist reception structures influence directly Gross domestic product in the tourism industry at the regional level and, consequently, regional economic recovery.

IV. Conclusion

A significant challenge for sustainable development is regional growth based on full, productive but decent work, in line with UN No. 20 (United Nations 2015). The tourist activity represented by the tourists' arrivals in the tourist units, the labor force involved, together with GDP, on the background of sustainable development, are factors that can activate the policies and initiatives towards a regional economic revival of Romania after the economic and financial crisis of 2008.

In this context, the work aimed at identifying co integration relations between the number of arrivals of tourists in the tourist accommodation establishments in Romania by development regions, the occupied population in hotels and restaurants and GDP in tourism.

The analysis made evidenced by the evolution indices the growth trends of the three variables used. If until 2008 the flow of tourists was slower compared to the employed population in tourism, the trends have reversed after the year of the crisis. Thus, after 2010 the regional discrepancy between the Center, Bucharest-Ilfov and South-West Oltenia was manifested in the number of arrivals in the tourist reception structures.

The disparities that occur between regions, at each variable level, have been a challenge to research the existence of a long-term relationship between them. The results allowed the used of VAR and VEC models.

Procesul de elaborare a modelului, precum și testarea relaţiilor de cauzalitate care apar între cele trei variabile endogene a presupus testarea staţionarităţii seriilor de date cu Unit Root Test of Augumented Dickey-Fuller type. Apoi, s-a recurs la aplicarea Johansen Cointegration Test pentru verificarea existenței relațiilor de cointegrare, împreună cu testate semnificaţiile statistice ale valorilor parametrilor.

The results, due to the methodology used, facilitated the formation of a clearer image on the existence of a cointegration relationship between the variables analyzed. In this context, the significant impact of the arrivals flow in the tourist reception facilities, on the one hand, on the employed population, and on the other hand on GDP in tourism at the regional level was highlighted.

The challenges of employment tourism (seasonality, wages, working conditions, differentiation by type of staff, etc.) need to be addressed in the future, both from the perspective of human resource development and its preservation as a key to sustainability.

Thus, the development of human resources in tourism implies on the one hand high professional and

educational training and, on the other hand, the attitude, sensitivity and practical responsibility, adapted to the environment, local society, culture and economy (Jithendran and Baum, 2000).

Within the framework of sustainable human resources at regional level, three important elements are addressed (Mazur, 2009): in the future, an employee-supported offer; decent jobs in ILO terminals; capable and responsible employees, inclined to take more care of the planet (Liebowitz, 2010).

With sustained, past and future growth in tourist arrivals, labor mobility is focused on tourist fluctuations. Thus, it can be mentioned that regional economic development requires people to move away from work supply (Urry, 2000), policies being directed to meet this strategic requirement.

An important role in the direction of sustainable regional development is the tourism education directed towards the individual, both from the perspective of the tourist and that of the employee. Thus, educators need to make a significant contribution to educating future abolitionists, leaders and employees (Wade, 1999).

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