THE RELATION BETWEEN TOURISM AND UNEMPLOYMENT: A PANEL DATA APPROACH

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Abstract
Tourism is one of the fastest growing sectors of the world economy. Tourism development may contribute to reduction of unemployment both directly and indirectly. This paper empirically investigates this hypothesis holds for Romania regions for the period of 1990 -2015. A panel data approach is utilized and coefficient estimates are obtained by using fixed effect and random effect models. As a result, the hypothesis that tourism contribute to reduction of unemployment is verified based on the regression results.

Keywords: *Unemployment rate; tourism; panel analysis*

JEL Classification: *E24, J21, F24, F16.*

I. INTRODUCTION

Unemployment, broadly speaking, can be considered one of the major dysfunctions of the labour market. This is not always the case. Unemployment, in a modern economy, has its place. The main issues are its dimensions, its distribution across population groups, its persistence in the case of a person or group of people, the amount of the unemployment benefits with respect to salary and for what period it should be given etc.

The analysis of the available data over the last years has shown that Romania ranks last in the EU with regard to the rate of people employed in agriculture. This indicates Romania's lagging behind in comparison with the structure of the other EU countries' economies, this also being the main cause for the low efficiency level on the whole of the national economy and for distortions on the labour market (Albu, Caraiani, Iordan, 2011).

At the EU level there is a strong positive correlation between the ratio of the population employed in the service sector out of the whole of the employed population and the level of the GDP, while the correlations between the ratio of the population employed in the industry sector and the GDP and, respectively, the ratio of the population employed in agriculture and the GDP were negative.

In the economic literature it is emphasized that, in general, the long-term dynamic of the national economies in the contemporary age features the increase of the tertiary sector's importance in GDP as well as in the whole of the labour force, this signifying the transition from an underdeveloped economy to a modern one. Sometimes, even the discrepancy between countries from the perspective of the economic development degree is assessed on the basis of the differences that exist with respect to the contribution of the service sector to the constitution of the GDP.

Currently, Romania, despite all the efforts made is still trailing behind greatly the European average in regard to the level of socio-economic development in general and the productivity of the national labour. At macro-economic level, one of the fundamental reasons is the numerous discrepancies that differentiate, on the structural level, Romania from the situation in the advanced countries and from the European average with regard to a number of performance indicators. In the first place, we are referring to the distribution of the labour force across the three big economy sectors. If in the case of industry the importance of employment is close to the European average, the major discrepancies are found in the case of agriculture and, respectively, services. Agriculture is oversized in Romania's case with regard to the available employed population to the detriment of the service sector. It is so in the circumstances in which it is known that in a modern economy, well-articulated, agriculture has decreased its importance in comparison with other sectors (Albu, Caraiani, Iordan, 2011). Indeed, in the modern age, the impressive increase of performance in agriculture owing to scientific and technological applications has ensured the release of the labour force for other economic sectors simultaneously with the rise of the income for those left to work in agriculture. The rapid growth of labour productivity in agriculture in the developed countries has led to a significant closeness of its level to that of other fields of activity.

In the conditions of modern economy, the labour force mobility represents one of the underlying conditions for development. This (i.e. mobility) is given by the criterion of efficiency, the labour force heading towards the more productive sectors or geographical areas where obviously the salaries, the incomes in general, are higher. Mobility is yet restricted by the degree of labour market's flexibility as well as a range of specific conditions. According to economic theory and practice, the capital, having the tendency of migrating to the more profitable sectors and regions, attracts with it a labour force that over time will get increased income. On the other hand, in receding sectors or regions, the capital dissipates, unemployment rises and the labour force migrates.

The labour force mobility is also influenced, apart from the differences among economy sectors, salaries, productivity, labour conditions, etc., by the differences existing at territorial, regional, county and place levels. One of the factors is the distribution across regions of the gross income and the net income.

Lilien (1982) points out that the shift of industrial composition affects not only the unemployment rate at the macro level, but also the industry mix and labor demand at the regional level. Therefore, industry composition affects regional unemployment rates. The more capital-intensive an industry is, the higher the unemployment rate will be as capital may substitute for labor. Hence, the manufacturing industry tends to have a higher unemployment rate than the agriculture industry or services industry.

II. METHODOLOGY

Econometrics analysis relies on the estimation of a model such as a panel using the R Studio software package. We have decided the estimation of this type of regression model based on panel-type data as data panels control the individual heterogeneity (Hsiao, 2003). Furthermore, the panels offer a larger amount of information, increased variability, low probability for collinearity between the used variables and more degrees of freedom. Similarly, the analysis results based on panel-type data are more efficient since they give the possibility to identify and measure effects that are not detectable through the analysis of cross-sectional data or of time sequences.

A regression of the panel type has the following formula:

$$y_{it} = \alpha_i + x_{it}' \times \beta + \varepsilon_{it} \qquad i=1...N,\ t=1...T$$

where *i* represents the cross-sectional dimension and *t* represents the temporal one.

When one makes an estimate of a data panel, the first step is to determine whether the regression is a panel-like model or an ordinary regression (Baltagi, 2008). The simplest test for grouping the data has as null hypothesis the model of ordinary regression and as alternative hypothesis the model with fixed effects. In other words, the presence of individual effects is being tested. In the case of the ordinary regression model, the method of least squares (OLS) is applied to the model obtained through the elimination of the individual average values, thus eliminating the fixed effects. Given that through this method the variables established over time are eliminated, their use in this model is not recommended. In the case of the model with fixed effects the most used estimator is also known as the *within* estimator.

The next step should be to determine what model is more suitable: one with fixed effects or one with random effects. This decision can be made on the basis of some tests, economic reasons and/or informational criteria. Baltagi proposes the use of these methods; therefore, both models can be estimated and the choice is to be made according to the informational criteria and or economic reasons.

A great advantage of the panels is the fact that solid estimations can be obtained even with endogenous regressors as long as these are correlated with that part of the error found over time (Stănilă, Andreica, Cristescu, 2013)

For the model with random effects, the term α_i from the above relationship is incorporated in the error and presumed uncorrelated with explanatory variables.

Taking into consideration this hypothesis, the next model represents a model with random effects:

$$y_{it} = x_{it}' \times \beta + u_{it} \quad i = 1,...,N, t = 1,...,T$$

An advantage of the model with random effects is the fact that it allows the use of the explanatory variable found over time; a great disadvantage is the fact that the model with fixed effects would be more suitable while the estimations obtained through the model with random effects would not be solid.

The random effect model is a generalized regression model and all disturbances have variance $Var(\varepsilon_{it}+\alpha_i)=\sigma^2=\sigma^2_{\varepsilon}+\sigma^2_{\alpha}$ (Chuang, Lai, 2008).

If the explained variables correlate with α_i, then α_i will not satisfy the presumed condition. The estimated parameters of the random effect model will produce error. On the contrary, if α_i satisfies the condition, using the random effect model will be more efficient than using the fixed effect model.

To verify the appropriate model, the Hausman (1978) test for random effect model or fixed effect model is used. The null hypothesis is

H_0 : α_i does not correlate with explained variables

H_1:$(b_{fix}-b_{ran})'(M_{fix}-M_{ran})^{-1}(b_{fix}-b_{ran}) \sim \chi^2$

Where b_{fix} and b_{ran} are respectively the estimated parameters of the fixed effect model and random effect model, M_{fix} and M_{ran} are the corresponding covariance matrices.

In the literature, factors that cause the discrepancies in the unemployment rate across regions include compensating differentials for amenities and opportunities of employment (Hall, 1972, Marston, 1985, Greenwood and Hercowitz,1991); increasing costs of migration arising from community identity or social networks (Partridge and Rickman 1997); demographic composition such as age, gender, education, and family background (Feasel and Rodini 2002); and industry composition and labor mobility (Partridge and Rickman 1997). Marston (1985) asserts factors due to the cost of migration as being disequilibrium factors while that due to heterogeneous labor preference such as compensating differentials are as equilibrium factors. Overall, the macro environment is potentially an underlying common factor that affects the unemployment rate across regions.

Demographically speaking, in general, a higher percentage of young people who enter the labour market leads to an increase in the unemployment rate. This aspect is argued for by Topel and Ward (1992) and Lin (2000) in the sense that young people have the

tendency to seek a job that suits them in a more intense manner and this leads to their changing their job more often.

Similarly, the balance of residence change at regional level may be used as a way of approximating the opportunities of finding a job and of discovering the prosperity potential of the regions.

According to Hall (1972) the employed are influenced by the appropriate aspects of life quality at regions' level, which means that better facilities are matched by a higher unemployment rate. The population living in a community that benefits from a better life quality is more tolerant towards a higher unemployment rate.

In order to explain the variation of the unemployment rate across Romania's developing regions we have used the series of data offered by the National Institute of Statistics from the Tempo-online databases out of which we extracted the series corresponding to the 1990-2015 period for the following variables that can characterize the evolution of the hotels and restaurants sector:

- the total number of graduates
- the monthly net average nominal income in the hotel and restaurant sector
- the turnover of active local establishments from the hotel and restaurant sector
- gross investments in material assets in the active local establishments from the hotel and restaurant sector
- the population employed in the hotel and restaurant sector.

III. ECONOMETRIC RESULTS

As we have also mentioned in the methodological section, the individual effect specific to each region (α_i) may be a fix parameter that can be estimated if the model is with fixed effects or may be a random perturbation that affects a specific region if the model is with random effects. In the case of the model with fixed effects, the variable expression may differ from region to region but is unchanging over time; the slope of regression is instead the same for all the regions. The models with random effects, on the other hand, allow the estimation of variables that remain unchanged over time.

In order to make a solid decision three models have been estimated, namely:

- the model obtained through regression
- the panel-type model with fixed effects
- the panel-type model with random effects.

Table. 1 – The summary of the identified models

	Dependent variable: Unemployment rate		
	Pooled OLS Regression	*Fixed Effect Model*	*Random Effect Model*
The total number of graduates	-2.600***	-2.356***	-2.349***
The monthly net average nominal income in the hotel and restaurant sector	0.107	0.424*	0.402*
The turnover of active local establishments from the hotel and restaurant sector	-1.032**	-0.508	-0.533
Gross investments in material assets in the active local establishments from the hotel and restaurant sector	1.201***	0.660**	0.692**
The population employed in the hotel and restaurant sector.	0.567	-0.715	-0.549
Constant	34.327***		32.077***
Observations	144	144	144
R^2	0.145	0.129	0.127
Adjusted R^2	0.114	0.050	0.095
F Statistic	4.664*** (df = 5; 138)	3.896*** (df = 5; 131)	4.010*** (df = 5; 138)
Note:			*$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$*

To decide which model is more suitable to characterize the manner of influence for the factorial variables on the resulting variable (the unemployment rate) we have used the Hausman test.

The Hausman test puts to test the following hypothesis:

H_0–the model with random effects is recommended

H_1–the model with fixed effects is recommended

The results are presented below:

chisq=1.0243, df = 5, p-value = 0.9606

Since the *p-value* is greater than 5% we can not reject the null hypothesis, so random effects model is recommended.

The next decision is to choose the appropriate model between the one with random effects and the one obtained by means of multiple regression. In this case we have used the Lagrange Multiplier Test - (Breusch-Pagan). The Breusch-Pagan test puts to test the following hypothesis:

H_0–the Pooled OSL model is recommended

H_1–the model with random effects is recommended

The results are presented below:

chisq=230.18, df = 1, p-value<2.2e-16

As the *p-value* is less than 5% the null hypothesis is rejected and the alternative one is accepted and in this way the model with random effects is the recommended one and is actually reconfirmed by means of this test, too.

Another aspect that should be checked before interpreting the regression coefficients is whether the model residue has autocorrelation or serial correlation. In order to verify this we used Pesaran CD test for cross-sectional dependence in panels.

The Pesaran CD test for cross-sectional dependence in panels puts to test the following hypothesis:

H_0– There is a serial correlation at the residue level of the model

H_1–There is no serial correlation at the residue level of the model

The results are presented below:

z = 1.8159, p-value = 0.06939

Since the *p-value* is greater than 5% we can not reject the null hypothesis, so we can conclude that there is no serial correlation at residue level with random effects.

Out of the analysis of the values yielded by the panel-type analysis with the help of the random effects model the following conclusions can be drawn:

- The link between the total number of graduates and the unemployment rate is of a reverse type, which enables us to say that a one per cent increase in the total number of graduates leads to a 2.3% increase of the unemployment rate. This thing can be explained through the fact that Romanian young people in general don't seek a job immediately after finalizing their studies and prefer to remain for a while under the family's 'protection' or choose emigration to the EU developed countries.
- The achieved model emphasizes a direct relationship between the unemployment rate and the variable of the monthly net average nominal income in the hotel and restaurant sector. Thus, we can construe that a one per cent increase in the monthly net average nominal income in the hotel and restaurant sector results in a 0.4% per cent of the unemployment rate. This abnormal situation can be explained by the employee's very low degree of stability from the hotel and restaurant sector especially among the young employee. Even if the salaries have recorded increases over the last years, these have not been significant and the whole of the salaries in this sector for most employees has remained around the minimum wage worth. Also, knowing the seasonal feature of the tourist industry, a customary practice in the hotel and restaurant sector is that without written employment contract. This thing has made it more and more difficult for employers from the hotel and restaurant sector to find employees and keep them for longer terms. In conclusion, changes in the monthly net average nominal income in the hotel and restaurant sector does not manage to represent a significant motivating factor with respect to attracting labour force.

- Unfortunately, for the turnover in the active local establishments from the hotel and restaurant sector, the found model did not offer an illustrative value from a statistical point of view. The regression value is negative thus indicating a reverse relationship between the unemployment rate and the turnover of active local establishments from the hotel and restaurant sector.
- The coefficient of the gross investments variable in material assets in active local establishments from the hotel and restaurant sector has a positive value which indicates a direct connection with the dependent variable. On account of the achieved value it may be ascertained that a one per cent increase in gross investments in material assets in the active local establishments from the hotel and restaurant sector results in a 0.69% increase of the unemployment rate. This aspect can be explained based on the fact that these investments do not require employing new staff as the management of these establishments seek to cut down on costs with the human resource.
- Similarly to the variable turnover in the active local establishments from the hotel and restaurant sector, the variable of the employed population in the hotel and restaurant sector

was not sufficiently conclusive, from a statistical point of view, as it had emerged from the model with regard to the estimated value. The regression value is negative thus indicating a reverse link between the unemployment rate and the employed population in the hotel and restaurant sector.

IV. CONCLUSIONS

The purpose of the analysis was to identify the relevant factors of influence on the unemployment rate variable across Romania's developing regions in terms of the variables that can characterize the evolution of the hotels and restaurants sector.

The econometric analysis was based on the estimation of a panel model using the R Studio software package. The analysis results based on panel-type data are more efficient since they give the possibility to identify and measure effects that are not detectable through the analysis of cross-sectional data or of time sequences.

In order to explain the variation of the unemployment rate across Romania's developing regions we have used the series of data offered by the National Institute of Statistics from the Tempo-online databases out of which we extracted the series corresponding to the 1990-2015 period for the following variables that can characterize the evolution of the hotels and restaurants sector:

- the total number of graduates
- the monthly net average nominal income in the hotel and restaurant sector
- the turnover of active local establishments from the hotel and restaurant sector
- gross investments in material assets in the active local establishments from the hotel and restaurant sector
- the population employed in the hotel and restaurant sector.

Three models have been estimated, namely:

- the model obtained through regression
- the panel-type model with fixed effects
- the panel-type model with random effects.

In order to decide which model is suitable to characterize the influencing mode of the factorial variables upon the resulting variable (unemployment rate) we have used the Hausman test to differentiate between the model with random effects and the model with fixed effects, and, afterwards, the Breusch-Pagan test to choose the right model between the model with random effects and the model obtained with the help of multiple regression. With the help of these tests it was possible to establish that the model with random effects is the recommended one.

Equally, for this model we have applied the Pesaran CD test with the aim of identifying the presence of autocorrelation or serial correlation. As the resulting *p-value* was 5% higher, we have concluded that the serial correlation is not present at the level of the random-effects model's residues.

Out of the analysis of the values yielded by the panel-type analysis with the help of the random effects model the following conclusions can be drawn:

- The link between the total number of graduates and the unemployment rate is of a reverse type, which enables us to say that a one per cent increase in the total number of graduates leads to a 2.3% decrease of the unemployment rate.
- The achieved model emphasizes a direct relationship between the unemployment rate and the variable of the monthly net average nominal income in the hotel and restaurant sector. This aspect, apparently abnormal, shows that changes in the monthly net average nominal income in the hotel and restaurant sector does not manage to represent a significant motivating factor with respect to attracting labour force.
- Likewise, as in the case of the variable mentioned above, and in the case of the variable gross investments in material assets in active local establishments from the hotel and restaurant sector the regression coefficient has a positive value which indicates a direct connection with the dependent variable. This aspect has been interpreted as explaining that hotel and restaurant facility management is looking to minimize human resource costs even if they make significant investments in tangible assets.
- For the variable turnover in the local units active in hotels and restaurants sector as well as for the civil employed population in hotels and restaurants, the model failed to provide a statistically representative value for the calculated coefficients.

V. REFERENCES

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