A COMPARATIVE ANALYSIS OF EMPLOYMENT STABILITY IN TOURISM – EU, HUNGARY AND ROMANIA

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Abstract

The authors aim to measure the cross-country correlations in the area of stable employment in tourism. One item of interest for the analysis is the link, presumably non-existent, between stable jobs (people characterized by the average seniority of work in tourism). Upon testing the unit root for the data, we have resorted to differentiate them on the first order, a measure which indicates the acceleration, from one period to the next, of the indicator behind the data series. Our goal, thus, is to measure if labor force might shift from stable jobs in one analyzed country, to others. Then, multiple regression was applied on the data, including also two lags of the independent variables. The equations were commented from the viewpoint of their tests and characteristic, also we have used graphical representation to illustrate some points in the presentation.

Key Words: *tourism, job, seniority, difference, acceleration, correlation*
JEL classification: *L83, C51, C52*

Introduction

Job seniority with the same employer is an indicator of the stability of the job. By ensuring stable jobs, the employers can expect more dedicated employees, able to deliver a higher level of quality and more dedicated to the organizational values of the company. Global and international influences pose a great impact on tourism. "The tourism scene is influenced by a number of trends. However, the global outlook is decisive, also for those who will never make a career beyond the national or regional border" (Hjalager, 2003). Chen & Lee (2013) have studied the

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relationship between employee commitment and service quality in tourism, their conclusion is "job attitude and employee commitment are the basis for delivering quality service”. We have chosen to analyze the average seniority of work in Romania, EU28 and Hungary, by regression method.

Răducan (2008, 2011) has studied the possibilities of tourism development in Romania, under various facets. Păunică et al. (2018) have approached the application of regression in analysis of economic variables. Anica-Popa & Manole (2011) considered various facets of globalization.

Research methodology and data

One way if measuring job stability is the job seniority with the same employer. The aspects studied pursue the analysis of job seniority. The data were extracted from the EUROSTAT online database, indicator *Average seniority of work with the same employer and NACE Rev. 2 activity [tour_lfsq5r2]*, quarterly data. The value is measured as percentage from total (that is, both 2 years and above and less than two years), calculated for the seniority of at least two years. This value would contribute, in our opinion, to the dissipation of the "walk together” between the series, as Romania and Hungary are included in the EU28 dataset. All data reveal a higher percentage of seniority above two years, with a much lesser percentage of seniority below this barrier.

The research hypothesis particular to this item is:
H1. There is no correlation between the evolution of job seniority status (measured as percentage of the total) recorded in the selected geographic areas.
Such hypothesis could postulate the fact that there are no shifts, on short term, between the respective sections (tourism) of the labor markets.

The instrument that was chosen to study H1 is the multiple linear regression, considering each country dataset as an independent variable and the other three sets as dependent variables.

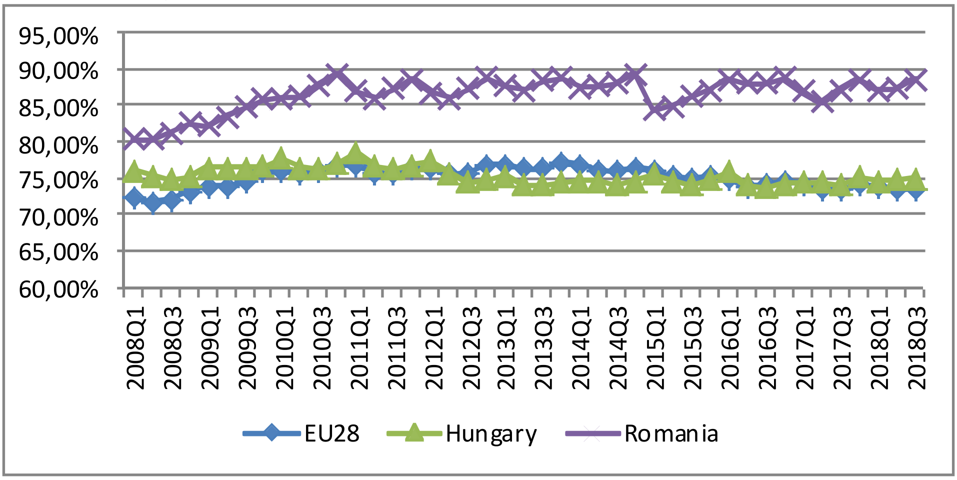
As the original data display non-stationarity, the variables were considered as their first differences, which can be interpreted as acceleration of the indicator rather than actual evolution.

Data processing was performed in *gretl (http://gretl.sourceforge.net/)*. All regression models were tested against the criteria specified by the linear model hypotheses.

Analysis of job seniority – both groups

The object of our analysis is the study of the average seniority of work with the same employer. The dataset chosen breaks the data into two categories, the border being represented by the two years landmark.
the comparative analysis of the indicator in Romania is presented in the following graph.

Figure 1: *The percentage of senior employed in EU28 and selected countries (2 years or over)*



Source: *Data processing by the authors, based on EUROSTAT data, indicator Average seniority of work with the same employer and NACE Rev. 2 activity [tour_lfsq5r2]*

The comparative chart displays a higher level of stability (seniority) which favors the Romanian tourism dataset, which also displays a slightly upward trend, at a minimum percentage value of 80.47% and a maximum 89.54%.

The increasing trend (at a gap of 9.07 percentage points between minimum and maxim values) had the following evolution: an increase at the beginning of the interval, then an oscillatory trend until the end of the interval.

It should be noted that Romania is placed above the European average, also characterized by a growing trend, with a minimum of 74.88% and a maximum of 83%. In both cases, there is an increasing trend during the final periods for which data are available.

In the case of Hungary, the evolution of the two lines is intermingled, as they move one above/below the other repeatedly. Both minimum and maximum values are placed below Romania.

As we refer to data regarding people who work for the same employer for more than two years, we do not take into account the potential seasonality of the data.

Taking into account the globalization of the labor market, including the tourism sector, we consider analyzing the correlations between Romania, Eu28 and Hungarian sectors, to see if there is some kind of causality between the data.

The instrument chosen for the analysis was the simple regression model, which tests the influence of one factor on the other.

First, the data were studied against the non-stationarity hypothesis, with the help of the ADF-GLS test implemented in *gretl*. The following results were achieved:

Table 1a: *ADF-GLS test on seniority above two years, levels*

S2_EU28	**S2_HUN**	**S2_ROM**
-3.21073	-1.66319	-1.54835

Source: *data processing by authors, in gretl. The tests were applied for a maximum of 1 lag. All the tests were performed with trend.*

Since the levels were found to be non-stationary, the first differences were tested. The first differences were tested again, with the same instrument, and the results are presented in Table 1b.

Table 1b: *ADF-GLS test on seniority above two years, first differences*

S2_EU28	**S2_HUN**	**S2_ROM**
-5.50716	-6.84487	-6.62087

Source: *data processing by authors, in gretl. The tests were applied for a maximum of 1 lag. All the tests were performed with trend.*

We accept the premise that differencing to stationary avoids spurious regression, as defined by Granger (2003), who also refers Yule (1926). The regression between differences would allow, if properly specified, measuring the short-term correlation between the variables. Considering also Granger (2003), we have added two lags for each variable, which would be used only in the context when they are exogenous. The endogenous variable shall remain the current one.

Thus, the equation for the European Union can be written as:

$$d\_S2\_EU28 = \alpha + \beta_1 * d\_S2\_HUN + \beta_2 * d\_S2\_HUN\_1 + \beta_3 * d\_S2\_HUN\_2 + \beta_4 * d\_S2\_ROM + \beta_5 * d\_S2\_ROM\_1 + \beta_6 * d\_S2\_ROM\_2 + \varepsilon. \quad (1)$$

where

α: the free term, that is the slope of the regression line;
β_i: the regression quotients;
ε: the error term;
d_S2_EU28: first difference of the variable for EU28;
d_S2_HUN: first difference of the variable for Hungary;
d_ S2_ROM: first difference of the variable for Romania;
d_S2_Country_code_i: ith lag of the first difference of the variable for the country specified by the code.

The estimation of the regression model via the OLS method is presented in the table below:

Table 2: *Model 1. OLS, using observations 2008:4-2018:3 (T = 40)*
Dependent variable: d_S2_EU28

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0.000539619	0.000569923	−0.9468	0.3506	
d_S2_HUN	0.0609166	0.0884806	0.6885	0.4960	
d_S2_HUN_1	−0.229957	0.0866294	−2.654	0.0121	**
d_S2_HUN_2	−0.214059	0.0819171	−2.613	0.0134	**
d_S2_ROM	0.183137	0.0466082	3.929	0.0004	***
d_S2_ROM_1	0.177057	0.0494839	3.578	0.0011	***
d_S2_ROM_2	0.0738243	0.0501478	1.472	0.1505	

Mean dependent var	0.000348	S.D. dependent var	0.006052
Sum squared resid	0.000391	S.E. of regression	0.003443
R-squared	0.726173	Adjusted R-squared	0.676387
F(6, 33)	14.58570	P-value(F)	4.66e-08
Log-likelihood	173.9494	Akaike criterion	−333.8987
Schwarz criterion	−322.0766	Hannan-Quinn	−329.6242
rho	0.364994	Durbin-Watson	1.190530

Source: *data processing by authors, in gretl.*

The parameters for model one allow the following conclusions to be stated:

- according to Ramsey's RESET test (squares and cubes), *Test statistic: F = 1.463840, with p-value = P(F(2,31) > 1.46384) = 0.247*. Therefore, at any level of significance, the null hypothesis of correct specification cannot be rejected, that is, we have correct functional form. However, the *p-value* is very high. This is an incentive to pursue another specification of the model, by eliminating the values that proven to be non-significant from the statistical viewpoint;
- if we observe the *Breusch-Pagan test for heteroskedasticity*, as the larger value of the LM test statistic is higher than the table value, and the *p-value* is 0.001878, the *heteroskedasticity* is present in the model. However, the *White test* displays no heteroskedasticity;
- all the normality tests fail to reject the null hypothesis, therefore the dataset provides normal distribution;
- the evolution (acceleration) of the number of jobs at the level of the European Union is in a weight of 67% explained by the regressors;
- the p-value of the mode is very low, which means a high degree of reliability for the model;
- the F-statistic (table value), is 3.6990 at 99% level of confidence, and the level achieved following model estimation is 14.58570. Thus, the potential of a model in which all β are 0 can be rejected;
- the only two parameters that are not statistically significant are *d_S2_HUN* and *d_S2_ROM_2*;
- the Durbin-Watson statistics suggests evidence of positive autocorrelation between the variables; however, it is between the critical values from the statistic table, thus there is no correlation in errors;
- the lags of the Hungarian first difference are not statistically significant either, because the *t-ratio* is smaller than the table value,

which does not allow the rejection of the null hypothesis, and the coefficients are not different from zero;
- this means that our *H1* hypothesis is invalidated in this case, as we have a correlation between the Romanian employment indicator and the EU one; however, the sub-unit value means that not all employees would apply then for similar jobs in the European Union;
- the Romanian main indicator and the first lag are statistically significant at 99%, where t-ratio is above the reference value, with their influence being positive. It can be said that there is a much higher probability of labor force changing between Romania and rest of the EU;
- the free term is not statistically significant.

The next step in our analysis is to replicate the aforementioned test, but omitting the two variables which are not statistically significant, by attempting to estimate the following equation:

$$D\_S2\_EU28 = \alpha + \beta_1 * d\_S2\_HUN\_1 + \beta_2 * d\_S2\_HUN\_2 + \beta_3 * d\_S2\_ROM + \beta_4 * d\_S2\_ROM\_1 + \varepsilon. \quad (2)$$

The results of the new tests are presented in the table below:

Table 3: *Model 2. OLS, using observations 2008:4-2018:3 (T = 40)*
Dependent variable: d_S2_EU28

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0.0003868 73	0.00056364 4	−0.6864	0.4970	
d_S2_HUN_1	−0.190710	0.0771469	−2.472	0.0184	**
d_S2_HUN_2	−0.241472	0.0767034	−3.148	0.0034	***
d_S2_ROM	0.158190	0.0450496	3.511	0.0012	***
d_S2_ROM_1	0.185921	0.0462393	4.021	0.0003	***

Mean dependent var	0.000348		S.D. dependent var	0.006052
Sum squared resid	0.000428		S.E. of regression	0.003496
R-squared	0.700521		Adjusted R-squared	0.666295
F(4, 35)	20.46739		P-value(F)	9.10e-09
Log-likelihood	172.1584		Akaike criterion	−334.3167
Schwarz criterion	−325.8723		Hannan-Quinn	−331.2635
rho	0.355407		Durbin-Watson	1.207985

Source: *data processing by authors, in gretl.*

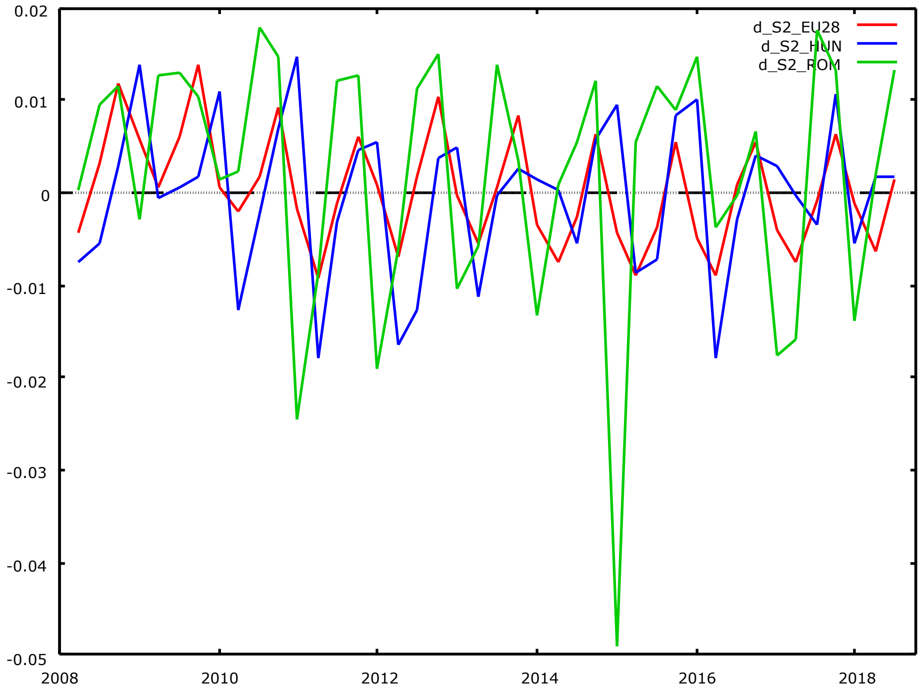
The regression hypotheses tests applied to the model provided for the following results:

- *Ramsey's RESET test*. The software calculated a test statistics *F = 1.443926, with p-value = P(F(2,33) > 1.44393) = 0.251*. The test parameters are very similar to the first model. The functional form stands, but *p-value* remains very close to the initial value;
- *Breusch-Pagan test for heteroskedasticity*. We have a similar *p-value* (compared to the previous model), which testifies for heteroskedasticity;
- *White test*: again, no heteroskedasticity is present, so we can accept the model in his form.
- *Normality tests*. We accept the normal hypothesis that all values of residuals are normally distributed. The mean of the residuals is 0, as calculated by *gretl*;
- The parameters β are very similar to the previous model and keep the same trend, a negative influence of variables for Hungary and a positive one in the Romanian case. However, the second lag of the Hungarian variable is now significant at a higher level of confidence;
- The DW statistics is also close to model no 1. Autocorrelation between the variables might be also revealed, at a later stage, by the switching between regression dependent/independent variables;
- What can be a surprise is the fact that the Adjusted R-Square for the model is little lower than in the previous case. We expected the model to be better specified;
- Again, a high *F(4, 35)* test, combined with a very low p-value, should testify for the accuracy of the model;
- Observing the information criteria, this model is better specified, although only by a small margin.

After analyzing both models, we can conclude that, in the case of the European Union, the acceleration of the number of positions with more than 2 years in the same company is positively influenced by the acceleration recorded in Romania, for the same period and the previous one (lag 1) and negatively influenced by Hungarian acceleration (for lags 1 and 2), as the current period is not statistically significant.

The graphical representation of all values in a time series plot displays that the series (first differences) follow, more or less, the same pattern, with Romania, which had the highest values of the level indicators, presenting the widest amplitude on the vertical axis.

Figure 2: *The percentage of senior employed in EU28 and selected countries (2 years or over), first difference, time series plot.*



Source: *data processing by authors, in gretl.*

Next, we shall estimate the model for Romania. This time, the following multiple regression equation is proposed:

$$D\_S2\_ROM = \alpha + \beta_1 * d\_S2\_EU28 + \beta_2 * d\_S2\_EU28\_1 + \beta_3 * d\_S2\_EU28\_2 + \beta_4 * d\_S2\_HUN + \beta_5 * d\_S2\_HUN\_1 + \beta_6 * d\_S2\_HUN\_2 + \varepsilon. \quad (3)$$

The results of the model estimation are presented in Table 4.

Table 4: *Model 3: OLS, using observations 2008:4-2018:3 (T = 40)*
Dependent variable: d_S2_ROM

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.00154484	0.00170375	0.9067	0.3711	
d_S2_EU28	1.61932	0.412240	3.928	0.0004	***
d_S2_EU28_1	−1.49067	0.497157	−2.998	0.0051	***
d_S2_EU28_2	0.688370	0.517455	1.330	0.1925	
d_S2_HUN	0.0970256	0.324869	0.2987	0.7671	

d_S2_HUN_1	−0.0126830	0.338683	−0.03745	0.9704	
d_S2_HUN_2	−0.00812632	0.330642	−0.02458	0.9805	

Mean dependent var	0.001834		S.D. dependent var	0.014087
Sum squared resid	0.003694		S.E. of regression	0.010580
R-squared	0.522668		Adjusted R-squared	0.435880
F(6, 33)	6.022373		P-value(F)	0.000246
Log-likelihood	129.0399		Akaike criterion	−244.0797
Schwarz criterion	−232.2576		Hannan-Quinn	−239.8052
rho	−0.208745		Durbin-Watson	2.416389

Source: *data processing by authors, in gretl.*

As seen from Table 4, the EU28 current is the only statistically significant regressors, at the level of confidence 99%, with a *t-ratio* above the critical. The first lag is characterized by a negative *t.*

- *Ramsey's RESET test* was measured by *gretl* as following: *Test statistic: F = 1.598644, with p-value = P(F(2,31) > 1.59864) = 0.218*, which indicates the null hypothesis, again, cannot be rejected and we are in the case of a linear model;
- *White test for heteroskedasticity*. The tests' values indicate that the errors are heteroskedastic, which is contrary to the homoscedasticity hypothesis of the linear regression model;
- The test for normal distribution does not offer valid results. The distribution of the errors is not normal (*Chi-square(2) = 27.186 with p-value 0.00000*);
- The mean is very close to 0, confirming the normality of the residuals;
- The *F-statistic* of the model is greater than the reference value, sustaining the idea of a statistically significant d*_S2_EU28* regressor.

The model does not respect all the assumptions of the multiple regression. Furthermore, only a parameter is statistically significant. Thus, the authors will pursue other econometric techniques to measure the impact designed in this model.

There is no need to remove the non-statistically significant variables from the model, as the only ones which remain are those indicated above.
The model for Hungary is based on the following equation:

$$D\_S2\_HUN = \alpha + \beta_1 * d\_S2\_EU28 + \beta_2 * d\_S2\_EU28\_1 + \beta_3 * d\_S2\_EU28\_2 + \beta_4 * d\_S2\_ROM + \beta_5 * d\_S2\_ROM\_1 + \beta_6 * d\_S2\_ROM\_2 + \varepsilon. \quad (4)$$

The results of the estimation are presented in the following table:

Table 5: *Model 4: OLS, using observations 2008:4-2018:3 (T = 40)*
Dependent variable: d_S2_HUN
HAC standard errors, bandwidth 2 (Bartlett kernel)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−4.42666e-05	0.000806581	−0.05488	0.9562	
d_S2_EU28	0.0869795	0.161335	0.5391	0.5898	
d_S2_EU28_1	0.888608	0.188887	4.704	<0.0001	***
d_S2_EU28_2	−0.680487	0.177442	−3.835	0.0001	***
d_S2_ROM	0.0240456	0.0663165	0.3626	0.7169	
d_S2_ROM_1	0.00530588	0.0942515	0.05629	0.9551	
d_S2_ROM_2	−0.0354169	0.0724940	−0.4885	0.6252	

Mean dependent var	0.000027		S.D. dependent var	0.008328
Sum squared resid	0.001105		S.E. of regression	0.005787
R-squared	0.591457		Adjusted R-squared	0.517176
F(6, 33)	7.254945		P-value(F)	0.000054
Log-likelihood	153.1761		Akaike criterion	−292.3521
Schwarz criterion	−280.5300		Hannan-Quinn	−288.0776
rho	−0.203510		Durbin-Watson	2.351798

Source: *data processing by authors, in gretl.*

The characteristics of the model are the following:

- *Ramsey's RESET test.* The software displays a test statistic F = 0.107619, while p-value = P(F(2,31) > 0.107619) = 0.898. The model is correctly specified;
- White test for heteroskedasticity. We have a *LM = 28.9519 with p-value = P(Chi-square(27) > 28.9519) = 0.363234*. The H0 hypothesis is accepted, the errors are not heteroskedastic;
- Normality tests. As the mean of residuals is 0, the normal hypothesis that all values of residuals are normally distributed holds. Also, the Jarque-Bera test produced similar results (skewness and kurtosis are close to 0);

- The only regressor that is statistically significant is the first lag for the European Union,
- *F-statistic* confirms the fact that there is at least one significant coefficient;
- We have a DW statistics of 2.351798, which suggests negative autocorrelation. Since only one parameter can be considered as a factor of influence, actually, the autocorrelation can be ignored;
- *Adjusted R-Squared* is higher than 50%.

Again, the authors will pursue further methods to measure the correlations between the selected variables.

Next, we shall proceed to the analysis of the less than stable jobs (considering, in our care, the 2 yrs. Barrier). The variables have been appended to the dataset and, first, the stationarity test ADF-GLS was applied.

Table 6: *ADF-GLS test on seniority below two years, levels*

EU28_b2	HUN_b2	ROM_b2
-1.40247	-3.16772	-2.48646

Source: *data processing by authors, in gretl. The tests were applied for a maximum of 1 lag. All the tests were performed with trend.*

All the level variables are non-stationary, at 5% significance. We have added the first differences, tested also with ADF-GLS. The results are presented in the following table.

Table 7: *ADF-GLS test on seniority below two years, first differences*

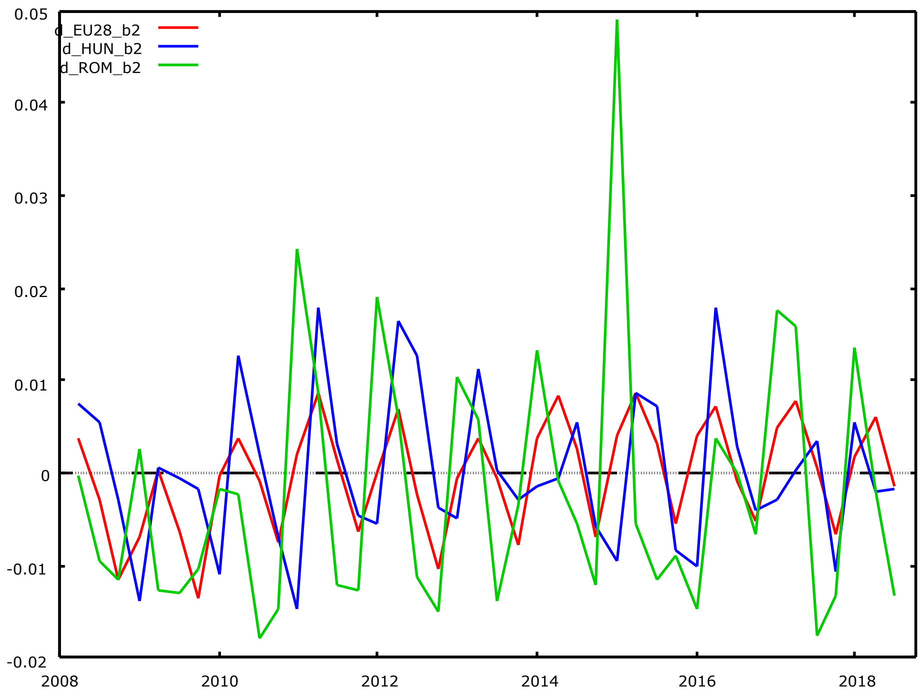
EU28_b2	HUN_b2	ROM_b2
-5.49322	-6.84859	-6.84859

Source: *data processing by authors, in gretl. The tests were applied for a maximum of 1 lag. All the tests were performed with trend.*

Thus, all differenced variables are stationary at a level of confidence of 99%. The evolution of the acceleration for the three variables is given in the following chart.

For the regression analysis, we state again, the models shall measure the impact of acceleration for independent variables on the acceleration of the dependent one. In our opinion, in short term, this proves no bias for statistic relevance of the results. Furthermore, as in the case of the previous regressions, we have included two lags for the independent variables.

Figure 3: *The percentage of senior employed in EU28 and selected countries (less than 2 years), first difference, time series plot.*



Source: *data processing by authors, in gretl.*

We can observe, again, that the amplitude of the Romanian variable is far greater than the other two.

The first model is built for the European Union. The standard equation is the following:

$$D\_EU28\_b2 = \beta_1 * d\_S2\_ROM\_b2 + \beta_2 * d\_ROM\_b2\_1 + \beta_3 * d\_ROM\_b2\_2 + \beta_4 * d\_HUN\_b2 + \beta_5 * d\_HUN\_b2\_1 + \beta_6 * d\_HUN\_b2\_2 + \varepsilon. \quad (5)$$

The model's characteristics are presented in the table below:

Table 8: Model 4: OLS, using observations 2008:4-2018:3 (T = 40)
Dependent variable: d_EU28_b2
HAC standard errors, bandwidth 2 (Bartlett kernel)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
d_ROM_b2	0.169986	0.0565123	3.008	0.0026	***
d_ROM_b2_1	0.167095	0.0546308	3.059	0.0022	***
d_ROM_b2_2	0.0590019	0.0427615	1.380	0.1677	
d_HUN_b2	0.0598025	0.0566808	1.055	0.2914	
d_HUN_b2_1	−0.222970	0.0658126	−3.388	0.0007	***
d_HUN_b2_2	−0.210261	0.0698754	−3.009	0.0026	***

Mean dependent var	−0.000280		S.D. dependent var	0.005931
Sum squared resid	0.000389		S.E. of regression	0.003382
R-squared	0.717151		Adjusted R-squared	0.675555
F(6, 34)	30.62772		P-value(F)	2.42e-12
Log-likelihood	174.0653		Akaike criterion	−336.1305
Schwarz criterion	−325.9973		Hannan-Quinn	−332.4667
Rho	0.390690		Durbin-Watson	1.152530

Source: *data processing by authors, in gretl.*

- Only the Romanian main variable and its first lag are statistically significant, at 99% confidence;
- *Ramsey's RESET test.* The value of the test statistics is below the table one; also, we have a *p* that is greater than any level of significance we can work with. Thus, the model is properly specified as linear (also, *p* for the square and cube estimates are higher than 0.1 breakeven of significance);
- White test for heteroskedasticity. We have a *LM =25.091474, with p-value = P(Chi-square(27) > 25.091474) = 0.569336.* The H0 cannot be rejected in this case, the errors are not heteroskedastic, and this characteristic of the regression model complies with the rules;
- The normality tests fail to produce a proper result. Both skewness and kurtosis are far from 0, it is consistent with the Jarque-Bera test at a level of significance of 90%;
- The only regressors that are statistically significant are the Romanian level and its first lag. For all other variables, the *t-ratio* is below the table value.
- *F-statistic*'s level is higher than the critical one, while the *p-value* is very low; thus, we have at least one significant coefficient;

- *Adjusted R-Squared* is higher than 77%, therefore over 67.55% of the EU independent indicator is explained by the model;
- Both regressors have value close to 0.17, meaning a below unit impact on EU's acceleration when the Romanian data increases by one unit, both in the current and previous (lag 1) period.

Due to the lack of normality in the regressors, the model cannot be fully trusted. This case makes an incentive for us to use, in our future research, other types of solutions, able to better describe the impact between the three countries.

The second model will be estimated for Romania. The regression equation is the following:

$$d\_ROM\_b2 = \beta_1 * d\_EU28\_b2 + \beta_2 * d\_\ EU28\_b2\_1 + \beta_3 * d\_\ EU28\_b2\_2 + \beta_4 * d\_HUN\_b2 + \beta_5 * d\_HUN\_b2\_1 + \beta_6 * d\_\ HUN\_b2\_2 + \varepsilon. \quad (6)$$

The OLS regression output is presented in Table 9.

Table 9: *Model 5: OLS, using observations 2008:4-2018:3 (T = 40)*
Dependent variable: d_ROM_b2
HAC standard errors, bandwidth 2 (Bartlett kernel)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
d_EU28_b2	1.72683	0.430568	4.011	<0.0001	***
d_EU28_b2_1	−1.60651	0.411723	−3.902	<0.0001	***
d_EU28_b2_2	0.879675	0.457003	1.925	0.0542	*
d_HUN_b2	0.126138	0.205332	0.6143	0.5390	
d_HUN_b2_1	−0.0327912	0.261607	−0.1253	0.9003	
d_HUN_b2_2	−0.0672876	0.165249	−0.4072	0.6839	

Mean dependent var	−0.001834	S.D. dependent var	0.014081
Sum squared resid	0.003664	S.E. of regression	0.010381
R-squared	0.534258	Adjusted R-squared	0.465767
F(6, 34)	20.50860	P-value(F)	5.46e-10
Log-likelihood	129.2024	Akaike criterion	−246.4047
Schwarz criterion	−236.2714	Hannan-Quinn	−242.7408
Rho	−0.178861	Durbin-Watson	2.355245

Source: *data processing by authors, in gretl.*

The model was tested against inconsistency, and its characteristics are the following:

- Only the EU28 main variable is statistically significant, at over 99% confidence, as testified by the *t-ratio* and *p-value*;
- The value of the *Ramsey's RESET test* is lower than the critical one, with a *p* that is greater than 0.1 barrier. We consider, under those assumptions, that the model is properly specified (the *p* for the square and cube estimates are above 0.7, which gives no choices for significance);
- White test for heteroskedasticity. The *gretl* software computed a *LM 32.285586, with p-value = P(Chi-square(27) > 32.285586) = 0.221672*. The null hypothesis of the test is accepted, the errors are 60homoscedastic;
- The model does not comply with the normality test. Skewness is close to 0 (0.16), but kurtosis is greater than 3. The Jarque-Bera test, at a level of significance of 99%, testifies in the same manner;
- *F-statistic*'s level is much higher than the table value, at a *p-value* that is low, thus there is at least one coefficient which is different from zero;
- *Adjusted R-Squared* is higher than 46%, therefore more than 46.57% of the Romanian independent indicator's acceleration is explained by the model;
- The significant regressor is characterized by a quotient of 1.17, which means an increase in Romania's acceleration by 1.17 units when the EU indicator accelerates by one unit.

The model for Hungary was estimated according to the following equation:

$$D\_HUN\_b2 = \alpha + \beta_1 * d\_S2\_ROM\_b2 + \beta_2 * d\_ROM\_b2\_1 + \beta_3 * d\_ROM\_b2\_2 + \beta_4 * d\_EU28\_b2 + \beta_5 * d\_EU28\_b2\_1 + \beta_6 * d\_EU28\_b2\_2 + \varepsilon. \quad (7)$$

The results of the model estimation are presented in the table below:

Table 10: *Model 6: OLS, using observations 2008:4-2018:3 (T = 40)*
Dependent variable: d_HUN_b2
HAC standard errors, bandwidth 2 (Bartlett kernel)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
d_EU28_b2	0.0239757	0.169030	0.1418	0.8872	
d_EU28_b2_1	0.907221	0.214618	4.227	<0.0001	***

d_EU28_b2_2	−0.728438	0.193585	−3.763	0.0002	***
d_ROM_b2	0.0374962	0.0572553	0.6549	0.5125	
d_ROM_b2_1	0.0154753	0.101481	0.1525	0.8788	
d_ROM_b2_2	−0.0268646	0.0731061	−0.3675	0.7133	

Mean dependent var	−0.000027		S.D. dependent var	0.008333
Sum squared resid	0.001133		S.E. of regression	0.005773
R-squared	0.581608		Adjusted R-squared	0.520080
F(6, 34)	6.700941		P-value(F)	0.000095
Log-likelihood	152.6786		Akaike criterion	−293.3572
Schwarz criterion	−283.2239		Hannan-Quinn	−289.6933
Rho	−0.208996		Durbin-Watson	2.378492

Source: *data processing by authors*

Only the 1st lag of the European Union is statistically significant, at a level of over 99%. The tests and characteristics of the model are presented below:

- The value of the *Ramsey's RESET test* is lower than the critical one, with a *p* that is greater than 0.1 barrier.
- White test for heteroskedasticity. The *gretl* software computed a *LM 32.839547, with p-value = P(Chi-square(27) > 32.839547) = 0.202417.* The errors are homoscedastic, thus the model validates this check;
- The model complies reasonably with the normality test. Skewness and kurtosis are close to 0;
- *F-statistic* at the level of the model is higher than the critical value, paired with a *p-value* that is low. At least one coefficient is non-null;
- *Adjusted R-Squared* is slightly higher than 52%.
- The quotient associated with the valid regressor (d_EU28_b2_1) is 0.90, an increase by unit of this variable leads to the increase by 0.90 of the Hungarian variable (in acceleration terms).

The model is compliant with all statistic tests.

Conclusion

The research hypothesis is not validated, as there are some inter-geographic correlations at the level of the studied indicator. The European Union average influences the other countries, as level (without lag variable). Romania positively influences the European Union indicator.

This means that a shift in job seniority (a form of stability) in one part determinates a shift in the other. The values are not collinear (regressors are not coupled with unit quotients). However, not all models satisfied the regression assumptions tests, therefore the authors shall, in their future research efforts, study the correlations between these variables with the assistance of other methods.

References

1. Gnu Regression, Econometrics and Time-series Library, http://gretl.sourceforge.net/

2. Granger, C.W. (2003). *Spurious Regressions in Econometrics*, in Baltagi, B.H. (ed.). A Companion to Theoretical Econometrics, Blackwell Publishing Ltd.

3. Hjalager, A-M. (2003). Global Tourism Careers: Opportunities and Dilemmas Facing Higher Education in Tourism. *Journal of Hospitality, Leisure, Sport and Tourism Education,* Vol. 2, No. 2, 26-38.

4. Lee, C.C., Chen, C.J. (2013). The Relationship between Employee Commitment and Job Attitude and Its Effect on Service Quality in the Tourism Industry. *American Journal of Industrial and Business Management*, No. 3, 196-208.

5. Manole, A., Anica-Popa, A. (2011). *Global Economic Perspectives-New Ways To Increase The Competitiveness In The World Of Business*. Managerial Challenges of the Contemporary Society, Proceedings, 97.

6. Păunică, M., Manole, A., Motofei, C., Tănase, G.L. (2018). The Globalization in the actual Context of the European Union Economy. *Sciendo,* Vol. 12, No. 1, 739-750.

7. Răducan, D. (2008). Strategia dezvoltării durabile a sectorului turistic în România - premisă prioritară în creşterea competitivităţii ofertei turistice pe piaţa mondială. *International Conference "PERFORMANŢĂ, TENDINŢE ŞI RISCURI ÎN TURISMUL MONDIAL*", Romanian-American University, 07 – 08 November 2008, Bucharest, Romania.

8. Răducan, D. (2011). Studii privind posibilitatea dezvoltării agroturismului şi a turismului ecvestru în România. *International*

Symposium "PERSPECTIVE ALE AGRICULTURII ŞI ZONELOR RURALE ÎN CONTEXTUL DEZVOLTĂRII DURABILE", USAMV Bucharest, 02-03 June 2011, Bucharest, Romania.

9. Yule, G.U. (1926). Why do we sometimes get nonsense correlations between time series? *Journal of the Royal Statistical Society,* No. 89, 1–64.