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A Cross-Region Panel Analysis of the Migration in Romania

Iulian - Alexandru CONDRATOV¹

Abstract

The main objective of this research is to realize a macroeconomic analysis of modeling factors for labour force emigration at the level of development regions from Romania. In order to achieve this objective, the research is based on macroeconomic models development which identifies, through explanatory variables, the main modeling factors of labour force emigration within a panel that comprises the eight development regions, analysed with the help of data offered by National Institute of Statistics for the period 1990-2016.

Taking into account the trends from the literature and the results of some empirical studies, we have built panel type models that estimate, based on statistical data for development regions of Romania, the main modeling factors of labour force emigration.

The econometric analysis was based on the estimation of a panel model using the R Studio software package. We took into consideration the following hypotheses:

- *There are specific defining elements regarding emigration of people from the eight development regions of Romania;*
- *The variables defined by number of graduates from high schools and colleges, unemployment rate and inflation rate have a significant positive influence over the number of emigrants;*
- *The variables defined by nominal average monthly net earning, average life expectancy and gross domestic product have a significant negative influence over the number of emigrants.*

Keywords:

Migration; labor market; education; macroeconomic modeling.

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1. Introduction

Technological developments have lead to less geographical obstacles regarding free movement of labour force. Thus, informations flow about jobs opportunities from a host country to numerous migrant workers countries of origin has been facilitated.

The impact of globalisation over employment has played and it still does an important role in the present economic policy. Although it is viewed as a threat by the workers from developed countries (because traditional jobs are vanishing or are relocated), increased employment in developing countries that is generated by the globalisation process, it is viewed as a major contribution in poverty lowering [1].

Labour force migration it is emphasized as a challenge for Europe, particularly regarding unqualified workers [2]. Also, human capital, meaning high qualified labour force, it represents the main resource. Thus, developed countries are dealing with an excess of request for qualified workers, request that can not be covered with local labour force, educated by the national system of education. And so, developing countries are becoming highly competitive regarding attracting highly qualified labour force in order to fill this gap.

2. Problem Statement

In 2015, 4,7 million people have migrated in one of EU 28 states and, from official data, at least 2,8 million immigrants leaved another EU member state. These data do not represent the total migration flows to/from EU because total migration flows are involving also the flows between different EU member states.

The total number of 4,7 million immigrants registered in 2015 it is estimated to be composed from: 2,4 million out of citizens from third party countries, 1,4 million were citizens of another EU member state than the host state, 860 000 were citizens of the host EU state (for instance nationals who come back to their homeland or those born in a foreign country) and 19 000 were stateless [3].

In 2015, the estimated number of immigrants from third party countries towards EU 28 was 2,7 million. Even more, 1,9 million people that had former residence in an EU member state have migrated towards another member state.

In 2015, immigrants from EU member states were, on average, much younger than the total population with residence in their host country.

On January 1st, 2016, the average age of EU-28 population was 42,6 years. Instead, the average age of immigrants from EU-28 was 27,5 years in 2015.

In the same time, the negative demographic trends, lack of abilities, lack of competences, and continuously high level of unemployment rate have contributed to a review of the restrictive policies regarding international migration of labour force by the european experts in charge.

It can be said that the labour force mobility in the EU, besides restrictions and the national legal status in the field of labour, is influenced profoundly by the level of GDP per capita, as a measure of the global social-economic development status and especially by labour productivity, which is reflected in the average revenue per capita or time unit [4].

If in the case of capital the mobility is generated by the profit rate or return on capital, in the case of labour the mobility is critical influenced by the level of productivity and in the last instance by the average level of earning.

The economic theory is saying that on a long term the migration of production factors should lead to an even level for the profit rate and also for labour productivity, average revenue. Tendency towards equalization would advance first in a national environment, between economic branches and between regions, and then, according to EU convergence programs, between member states.

With modern economy conditions, labour force mobility represents one of the main conditions for future development. Labour force mobility is defined by efficiency and is oriented towards more productive areas or branches where earnings are obvious much higher.

However, labour force mobility is restricted by labour market flexibility level and also another specific conditions. According to economic practice and theory, capital has a trend to migrate towards more profitable regions and economic branches, thus attracting labour force with higher revenue. Instead, capital is leaving, unemployment rises and labour force migrates from the regions and economic branches that are on a negative trend.

Main migration models that can be found in the economic literature can be grouped in two main categories:

- models that analyse determinants and modeling factors of international migration;
- models that follow the impact of migration over host country economies and country of origin economies, also over labour market [5].

In order to test different hypothesis that arise from fundamental theories and models about international migration, was used mainly multifactorial regression. This regressions use a set of dependent variables (net migration, net immigration, number of immigrants), and also independent variables (rising rhythm of GDP, GDP/capita, level of education, revenue differences, unemployment rate, inflation rate).

Fan and Yakita [6] have analysed the effects that are generated by the rise of earnings for highly skilled workers in host countries over decision process for individuals from country of origin regarding immigrations and education, also over the balance of labour market. The main results obtained show that a rise of earnings in the host country is encouraging immigration for highly skilled workers from the country of origin, with major (negative) implications over economic growth for developing source countries (brain drain) [7], but also with positive effects over productivity and equal chances in country of origin (brain gain) [8], [9], [10].

Recent studies about labour force immigration determinants [11], [12], [13] show the importance of demographic, geographic and social variables when analysing immigration rates and predisposition to emigration. The achieved results reveal that social and historical determinants have a low influence over migrant flows, unlike those geographical and demographical witch have a major impact upon these flows.

Bunea [14] tried to investigate on the potential determinants of internal migration in Romania using county data for the period 2004–2008 (NUTS 3 level). The dependent variable used was gross migratory flows from the origin country to the destination.

Prada, Ciupureanu and Oţoiu [15], using an OLS model referring to the business environment, labour market conditions, and living conditions in Romania , show that the business environment has serious shortcomings, so even though new companies are being created, the labour conditions and the wages offered are not sufficient as expected and people will further tend to migrate from Romania. Also, another factor that might influence Romanian emigration is the lack of housing, which shows that the low incomes obtained in the country are insufficient for investing in real estate.

3. Research Questions/Aims of the research

Taking into account the information previously presented, the main objective of this research is to realize a macroeconomic analisys of modeling factors for labour force emigration at the level of development regions from Romania. In order to achieve this objective, the research is based on

macroeconomic models development which identifies, through explanatory variables, the main modeling factors of labour force emigration within a panel that comprises the eight development regions, analysed with the help of data offered by National Institute of Statistics for the period 1990-2016.

Taking into account the trends from literature and the results of some empirical studies, we have built panel type models that estimate, based on statistical data for development regions of Romania, the main modeling factors of labour force emigration.

Thus, we took into consideration the following working hypotheses:

Hypothesis no. 1: There are specific defining elements regarding emigration of people from the eight development regions of Romania;

Hypothesis no. 2: The variable defined by number of graduates from high schools and colleges has a significant positive influence over the number of emigrants;

Hypothesis no. 3: The variable defined by unemployment rate has a significant positive influence over the number of emigrants;

Hypothesis no. 4: The variable defined by inflation rate has a significant positive influence over the number of emigrants;

Hypothesis no. 5: The variable defined by nominal average monthly net earning has a significant negative influence over the number of emigrants;

Hypothesis no. 6: The variable defined by average life expectancy has a significant negative influence over the number of emigrants;

Hypothesis no. 7: The variable defined by gross domestic product has a significant negative influence over the number of emigrants.

4. Research Methods

Econometrics analysis relies on the estimation of a panel model using the R Studio software package.

A regression of the panel type has the following formula

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

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. The simplest test for the grouping data has as null hypothesis the model of ordinary regression and as alternative hypothesis the model with fixed effects (FE). 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 [16].

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 [17] 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.

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:

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

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

$H_0: \alpha_i$ does not correlate with explained variables

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

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 order to explain the variation of the permanent emigrants number at the level of eight development regions of Romania we used the data provided by National Institute of Statistics through Tempo-online data bases. From these, we extracted the series related to years 1990-2016 for the next variables:

- Graduates from high schools
- Nominal average monthly net earning
- Average life expectancy
- GDP
- BIM unemployment rate
- Inflation rate

5. Findings

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 – Summary of the identified models

	<i>Dependent variable:</i>		
	<i>The number of permanent emigrants</i>		
	Pooled OLS Regression Model	Fixed Effect Model	Random Effect Model
Graduates from high schools	-1.075***	-0.436*	-0.443*
Nominal average monthly net earning	-1.784***	1.105**	-0.699**
Average life expectancy	11.562***	9.356***	12.282***
GDP	1.442***	-1.282***	0.384
Unemployment rate	-0.072***	0.006	-0.016
Inflation rate	-0.0005	0.003**	0.002
Constant	-34.704***		-40.449***
Observations	160	160	160
R ²	0.444	0.259	0.220
Adjusted R ²	0.422	0.193	0.190
F Statistic	20.324*** (df = 6; 153)	8.505*** (df = 6; 146)	7.208*** (df = 6; 153)

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 number of permanent emigrants) we have used the Hausman test.

The Hausman test puts to test the following hypothesis:

H₀ – the model with random effects is recommended

H_1 – the model with fixed effects is recommended

The results are presented below:

$\text{chisq} = 25.015$, $df = 6$, $p\text{-value} = 0.0003393$

As the p -value is less than 5% the null hypothesis is rejected and the alternative hypothesis is accepted and in this way the model with fixed effects is recommended.

The next decision is to choose the appropriate model between the one with fixed effects and the one obtained by means of multiple regression. In this case we have used the F test for individual effects. The F test for individual effects puts to test the following hypothesis:

H_0 – the pooled model is recommended

H_1 – the model with fixed effects is recommended.

The results of this test are presented below:

$F = 22.731$, $df_1 = 7$, $df_2 = 146$, $p\text{-value} < 2.2e-16$

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 fixed effects is the recommended one and is actually reconfirmed by means of this test, too.

	<i>Dependent variable:</i>
	<i>The number of permanent emigrants</i>
Graduates from high schools	-0.436*
Nominal average monthly net earning	1.105**
Average life expectancy	9.356***
GDP	-1.282***
Unemployment rate	0.006
Inflation rate	0.003**
Center Region	-0.592***
North-East Region	-0.527***
North-West Region	-0.543***
South-East Region	-1.135***
South Muntenia Region	-1.290***
South -West Oltenia Region	-2.234***
West Region	-0.965***
Constant	-21.685*
Observations	160
R^2	0.734
Adjusted R^2	0.710

Residual Std. Error	0.327 (df = 146)
F Statistic	30.946*** (df = 13; 146)
Note:	*p<0.1; **p<0.05; ***p<0.01

Most of calculated regression coefficients are significant from a statistical point of view for a maximum 5% level of significance.

Also, for the model with fixed effects we have identified a determination coefficient of 0,71. This value is showing that about 70% from variation of dependent variable, the number of permanent emigrants, is explained by the variation of independent variables introduced in the regression model.

Fig. 1 – Evolution of the number of permanent emigrants to the development regions, during 1990-2016

Compared to Bucuresti-Ilfov region, all other regions have a smaller number of permanent emigrants. This situation can be explained by the fact that Bucuresti-Ilfov region represents the region with the largest density of population.

6. Discussions

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

- The link between the total number of graduates and the permanent emigrants is of a reverse type so that we may say that one per cent increase of the total number of graduates leads to a diminishing of the permanent emigrants number by 0.44%. This can be explained through the fact that Romanian youths in general do not seek a job immediately after graduation and prefer to remain for a while under the family's 'protection'. The main motivation of emigration is represented by the need to have better life conditions, which most of the times means to obtain higher incomes. At the graduating stage, even though graduates manifest the will to search a working place in a foreign country and to move from home country, yet an insignificant number realises this vital step for their lives, at a so low age and experience.
- Nominal average monthly net earning is in direct and positive relation with the dependent variable. It is noted that nominal rises of earning can't stop Romanian citizens wish to emigrate, a rise of 1% for nominal average monthly net earning it is linked to a rise of 1,1% for the number of permanent emigrants. This aspect can be explained taking into consideration the fact that these nominal earnings raising haven't succeeded to lower the difference between wages in Romania and wages from developed countries, mainly from EU. Thus, we can say that the variable of nominal average monthly net earning represents another motivational factor in favor of the process that involves emigration of Romanians.
- Surprisingly, for the variable represented by the average life expectancy we also found a direct and positive connection with the dependent variable. It is noted that for a rise of 1% for average life expectancy we encounter a rise of 9,36% for final number of emigrants. Even though this variable comprises by the rise of its value, an improvement of life conditions in our country, it seems that Romanians are searching to improve their life conditions through other aspects, that are not present yet in a significant manner in their home country. This situation can be argued by a series of poor aspects of Romania: stability of economic/entrepreneurship environment, conditions from public health and education systems,

corruption and bureaucracy that are still present in public institutions.

- The economic growth of Romania revealed by GDP indicator represents a negative correlation with the dependent variable. A rise of 1% for GDP is connected to a decrease of 1,3% for the permanent emigrants number.

During the last five years, the economic growth of Romania was due mainly to rises of consumption, caused by ease of fiscality (VAT decrease from 24% to 19%) or due to the rise of earnings, mainly successive rises of the minimum wage.

Thus, we can say that the rise of GDP supported by the rise of consumption seems to be the main discouraging factor for the final emigration for the eight development regions analysed.

- The change of unemployment rate variable seems not to have a significant impact over the variation of dependent variable. Besides, the values of unemployment rate in Romania have situated for the last 5-10 years close to the average value of european countries [18].
- The inflation rate represents also a variable situated in close connection with the analyzed dependent variable. Based on the regression coefficient that was calculated by us it can be concluded that for a rise of 1% for inflation rate it was registered a rise of 0,003% for final number of emigrants. This aspect, besides other aspects revealed for the variables nominal average monthly net earnings and GDP, envisages the idea that the purchasing power represents a vital factor for romanians decision to emigrate, on the level of eight development regions of Romania.

As the panel-type model with fixed effects allows the identification of the individual effects of the regions included in the analysis, the values corresponding to this effects were also calculated. Their interpretation is done having as basis of comparison the Bucharest-Ilfov region.

From the analysis for coefficients of regression-calculation at regional level we can observe that high values of permanent emigrants number can be identified also at the level of following regions: Center, North-East, North-West. As possible explanations for this differences we can list some arguments that are linked to the regions economic environment, development opportunities made available by public policies, available road infrastructure, local mentalities, cultural-religious-ethnic connections.

Among the limits of this study we must mention those that are linked to data availability for development regions level, data that have

started to be collected by National Institute of Statistics at the same time with statistical methodologies harmonisation with EU practices.

Thus, this research may be resumed in order to identify the changes of determinant factors for emigration at the level of development regions of Romania, after strengthening more consistent data series at the regional level regarding economic development, public health and public educational systems development, and also strengthening the indicators that show the wellbeing level of local people.

7. Conclusions

The main objective of the research was represented by the macroeconomic of modeling factors for labour force emigration at the level of development regions from Romania. In order to achieve this objective, the research is based on macroeconomic models development which identifies, through explanatory variables, the main modeling factors of labour force emigration within a panel that comprises the eight development regions, analysed with the help of data offered by National Institute of Statistics for the period 1990-2016.

The econometric analysis was based on the estimation of a panel model using the R Studio software package.

In order to explain the variation of the permanent emigrants number at the level of eight development regions of Romania we used the data provided by National Institute of Statistics through Tempo-online data bases. From these, we extracted the series related to years 1990-2016 for the next variables:

Graduates from high schools

- Nominal average monthly net earning
- Average life expectancy
- GDP
- BIM unemployment rate
- Inflation rate

Three models were obtained, 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 (the number of permanent emigrants) we have used the Hausman test to

differentiate between the model with random effects and the model with fixed effects, and afterwards the F test to choose the right model between the model with fixed 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 fixed effects is the recommended one.

As the panel-type model with fixed effects allows the identification of the individual effects of the regions included in the analysis, we can say that hypothesis no. 1 of the study is validated, namely that there are distinctive defining elements regarding the population emigration from those eight development regions of Romania.

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

- The link between the total number of graduates and the permanent emigrants is of a reverse type so that we may say that hypothesis no. 2 is invalidated.
- The change of unemployment rate variable seems not to have a significant impact over the variation of dependent variable, which makes us consider hypothesis no. 3 as being denied.
- The inflation rate represents a variable situated in close connection with the analyzed dependent variable. Based on the regression coefficient that was calculated by us it can be concluded that for a rise of 1% for inflation rate it was registered a rise of 0,003% for permanent number of emigrants. We could thus consider hypothesis no. 4 is confirmed.
- Nominal average monthly net earning is in direct and positive relation with the dependent variable and by the arguments presented we consider that the fifth hypothesis is invalidated.
- Surprisingly, for the variable represented by the average life expectancy we found a direct and positive connection with the dependent variable, which also invalidates hypothesis no. 6.
- The economic growth of Romania revealed by GDP indicator represents a negative correlation with the dependent variable. A rise of 1% for GDP is connected to a decrease of 1,3% for the permanent number of emigrants. Thus, we can conclude that hypothesis no. 7 is confirmed.

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