Statistical and Econometric Analysis of the Correlations Between Migration and the Main Macro-aggregates in EU

Apostu Simona-Andreea
Bucharest University of Economic Studies
simona.apostu@csie.ase.ro

Abstract

The paper analyzes the existing interdependencies between the migration phenomenon and the main macroeconomic indicators that characterize the EU economy (net income, unemployment rate and life expectancy) during 2008-2015.

The EU, but not only face a substantial migration increase. As method, was used regression and principal component analysis using SPSS software.

The results show that the migration is strongly influenced by unemployment rate, level of education, net income and life expectancy.

Key words: migration, correlation coefficient, regression analysis, principal components analysis.
J.E.L. classification: C35, I31, J64, R58.

1. Introduction

Migration is a growing international phenomenon. At European level, after the Cold War, the movement of people was liberalized, people started migrating to improve their living conditions. Migration shows some advantages, such as intercultural exchanges, socialization, intercultural exchanges, but also has negative consequences, such as the depopulation of countries that offer less good living conditions.

In the literature are 3 categories of push factors: i) economic and demographic - high unemployment rate, low wages, high poverty gap, lack of jobs, unsatisfactory education and health care conditions; ii) political- conflicts, corruption and poor level of governance; and iii) cultural and social - discrimination, abuse of human rights (Gurcinaite, 2014).

Liu (1975) establishes that migration is connected with quality of life. The quality of life influence the decision to migrate. The incomes represent physically the quality of life.

Zhao (1997) determines that in China exists a link between migration and education level.

Martiskova (2013) analysed the migration and found that the main determinants of migration are the lack of career opportunities, the high unemployment rate, the political conditions, and the university crisis.

2. Data and method

The analysis is based on official data published by Eurostat. The variables used in the correlation analysis are:

Migration - Total number of emigrants;

Unemployment Rate - Unemployment rate (%), age 15-74;

Net Income - Median equivalised net income (Euro);

Education Level (%), age class from 15 to 64, upper secondary and post-secondary non-tertiary education (levels 3 and 4);

Life Expectancy - Life expectancy, less than 1 year.

The data is collected for 12 EU countries and the analysed period is 2008-2015. The methodology used is correlation analysis, factorial analysis (principal component analysis) and regression analysis.

Factorial analysis is primarily used to reduce the number of variables and to detect the structure of linkss between them. Principal Component Analysis (ACP) is commonly used as a descriptive method, for viewing the information contained in a quantitative data table, in particular the correlations existing between variables (Voineagu, 2007).

Regression is the existence of a statistical link on the behavior of some variables. The generalized linear model represents the class of regression models of the parameters that represent generalization of linear models. This type of model describes how the expected value of a dependent variable varies on the changes of an independent variable. In such models the main purpose is to find the best economic model that can represents the links between a dependent variable and some independent (Jaba, 2002).

3. Results and Discussion

The objective of this study is to assess the impact of macroeconomic indicators on migration.

Table no. 1. Matrix of correlation coefficients between macroeconomic variables

Correlations

		migratia	unemployment	net income	education	life_exp
migratia	Pearson Correlation	1	,759**	-,137	-,606**	,297**
	Sig. (2-tailed)		,000	,183	,000	,003
	N	96	96	96	96	96
unemployment	Pearson Correlation	,759**	1	-,554**	-,118	-,110
	Sig. (2-tailed)	,000		,000	,252	,284
	N	96	96	96	96	96
net income	Pearson Correlation	-,137	-,554**	1	-,556**	,665**
	Sig. (2-tailed)	,183	,000		,000	,000
	N	96	96	96	96	96
education	Pearson Correlation	-,606**	-,118	-,556**	1	-,734**
	Sig. (2-tailed)	,000	,252	,000		,000
	N	96	96	96	96	96
life_exp	Pearson Correlation	,297**	-,110	,665**	-,734**	1
	Sig. (2-tailed)	,003	,284	,000	,000	
	N	96	96	96	96	96

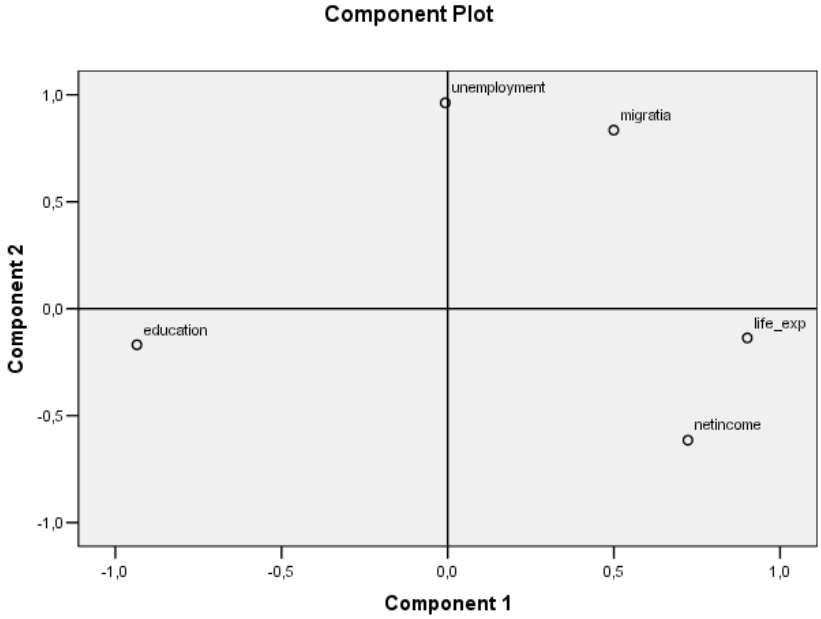
**. Correlation is significant at the 0.01 level (2-tailed).

Source: Own Projection, using SPSS

Analyzing the correlation between the variables studied (Table no. 1), there is a strong correlation between unemployment rate and migration. Increasing unemployment rates will increase also the migration phenomenon. Another strong link is between life expectancy and education, but this is reverse, when the number of people with levels 3 and 4 of education increases, life expectancy decreases. Instead, life expectancy registrate a direct and strong correlation with net income, when income increase, life expectancy increases, too.

The same conclusions result from the analysis of the graphical representation of all variables using factorial analysis (Principal Component Analysis). The analysis of the principal components shows that migration and net income are better explained by the second factorial axis, a direct link being established between its. The net income, life expectancy and education variables are explained by the first factorial axis, a direct link between the first two records, and between the two and the education level being an inverse, but strong link, i.e., when the number of people with level 3 or 4 of education increases, life expectancy and net income decrease.

Figure no. 1. The graphical representation of the variables on the correlation diagram, determined by the first two main components (which explains 90.17% of the initial variation)

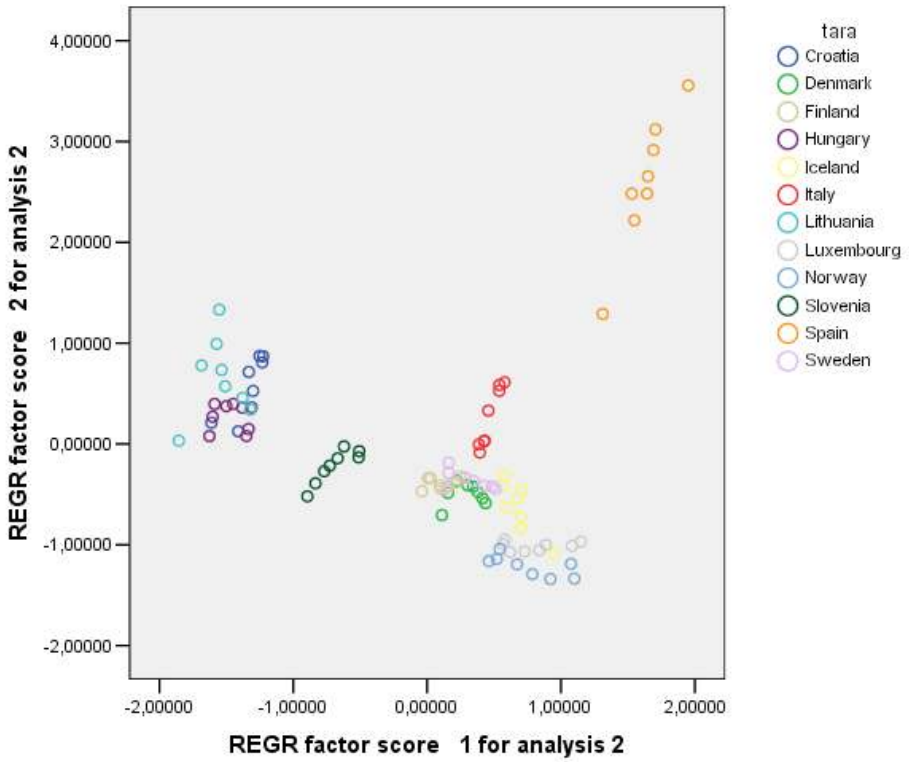


Source: Own Projection, using SPSS

If we analyze the figure 2, we notice that Spain records big values for migration for all the analyzed years, and Norway, Italy, Iceland, Denmark, Finland and Luxembourg have big net income.

Lithuania and Hungary registrate a large number of Level 3 and 4 graduates.

Figure no. 2. Evolution of the main macroeconomic indicators, represented on the main two components



Source: Own Projection, using SPS

In order to study the impact of the variables analyzed on migration, the regression function was determined. The regression equation is:

Migration= 247326,64+13069,81*Unemployment-1,25*Net Income-6205,84*Education

R^2=0,923, and F=175,64

The coefficients of the unemployment rate and education are significant for a probability of 99% and the coefficients of the net income variable for a probability of 90%. The model was validated with a high probability of 99%.

According to the model, if the unemployment rate increases with an unit, then the migration increases with 13069.81 units, if the other factors remain stable. If the net income decreases with an unit, then the migration increases with 1.25 units, while the other factors remain stable. When the number of persons of level 3 and 4 increases with an unit, the migration decreases with 6205.84 units.

4. Conclusions

Analyzing migration at EU level, there is an increasing trend. For this was analyzed the variables that influence the migration and it was concluded that is a strong correlation between unemployment rate and migration, between life expectancy and net income and an inverse correlation between life expectancy and education.

From the analyzed countries, for all the analyzed years, Spain records big values for migration, and Norway, Italy, Iceland, Denmark, Finland and Luxembourg have big net income. Lithuania and Hungary registrate a large number of people with Level 3 and 4 of education.

The regression equation for the 12 countries for the period 2008-2015 is:

Migration = 247326,64+13069,81*Unemployment-1,25*Net Income-6205,84*Education.

All coefficients are significant and the model was validated with a high probability of 99%.

The results revealed by our study using regression and principal component analysis are statistically relevant for the migration phenomenon in EU.

Subsequent developments in the study should enlarge the sample, and should also include other social and economic factors. Moreover, depending on the possibilities of accessing the necessary specific data, the study can also be applied at Romania's regions level.

5. References

- Gurcinaite, V., 2014. Labour Force Migration within EU: Analysis of Push and Pull Factors. *Central European University*, Department of Economics, Available at: http://www.etd.ceu.hu/2014/gurcinaite_viktorija.pdf.
- Jaba, E., 2001. *Statistics. 2nd Edition.* Bucharest: Economic Press.
- Liu, B.C., 1975. Differential net migration rates and the quality of life. *The Review of Economics and Statistics*, Vol. 57, No. 3, pp. 329-337.
- Liu, B.C., 1975. Differential net migration rates and the quality of life. *The Review of Economics and Statistics*, Vol. 57, No. 3, pp. 329-337.
- Martiskova, M., 2013. *What are the main reasons for young Greeks to emigrate?*, Master Thesis, University of Twente, School of Management and Governance, Available at: http://essay.utwente.nl/62981/1/MARTISKOVA__s1027611_MASTER_THESIS.pdf.
- Voineagu, V., Titan, E. 2007. Factorial Analysis. Andrei Saguna Press: Constanta.
- Zhao, Y., 1977. Labor Migration and Returns to Rural Education in China. *American Journal of Agricultural Economics*, Volume 79, Issue 4, pp. 1278–1287.
- www.eurostat.eu