FACTORS THAT INFLUENCE MIGRATION: PANEL ANALYSIS IN THE EU

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Biographical Note

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Abstract

Migration is a phenomenon that occurs from ancient times, but the development of transport and the liberalization of human movement have led nowadays to extremely high migration flows**.** Migration allows people to go where they consider it can be better for them, both socio-educationally, and financially. Migration facilitates globalisation and intercultural exchanges, but has also negative consequences**.** Countries that offer less welfare or education will suffer depopulation, due to the movement of population towards more attractive countries from these points of view. Within the EU, the phenomenon of migration has grown after the falling of the Berlin Wall during the Cold War. People start emigrating as they have found better living conditions in other countries. Lately, the migration phenomenon reached, somehow a worrying dimension, especially among young people. In such a context, the purpose of this study is to analyse the migration intention among EU countries over time. In this sense, several socio-demographic and economic characteristics were analysed for a period of time, i.e., number of migrants, unemployment rate, level of education, net income and life expectancy. Due to data availability issues, only 12 EU countries were analysed. The panel regression method was employed using SAS 9.4 software. The results show that migration is strongly influenced by the unemployment rate, level of education, net income and life expectancy, but there are no significant differences for each year.

Keywords: migration, unemployment rate, level of education, net income, life expectancy, EU, panel regression

JEL Classification: C33, R10, R12, R58

1. Introduction

Migration is a phenomenon encountered since ancient times. People have always travelled across borders, experimenting intercultural exchanges, better living conditions, and socializing. Migration also has disadvantages, including depopulation, parental leave and family breakdown, and psychiatric problems among children left at home.

Migration represents an obvious contemporary manifestation of globalization. International migration is divided in: low-skilled labour migration, high-skilled labour migration, irregular migration, international travel, lifestyle migration, environmental migration, human trafficking and smuggling, asylum and refugee protection, internally displaced people, Diaspora, remittances and root causes. The most unregulated at global level is labour migration (Betts, 2001).

Migration's evolution and its factors of influence is one of the most debated research topics in the literature. The main push factors of migration are usually grouped into 3 categories: 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).

Migration is associated with the place of origin and destination, obstacles and personal characteristics that interfere, so that the volume of migration differs according to all these factors.

Changes in migration volume are related to the diversity of regions and population, with difficulty and economic fluctuations (Lee, 1966).

Todaro (1969) analyzes migration across environments. The urban-rural migration model represents a realistic change and extension of the simple wage differential approach found in the literature. Income represents the variable that influences migration the most. When analyzing the supply of urban labour, the independent variable is not only the real income difference, but the rural-urban differential expected, i.e. the difference adjusted for the probability of finding an urban job.

R.J. Hicks affirmed on the issue of geographical mobility of labour that "differences in net economic advantages, chiefly differences in wages, are the main causes of migration"; a considerable number of studies in the USA confirmed his statement (Greenwood, 1975).

Liu (1975) establishes a link between net migration and quality of life. The decision to migrate aims to maximize the quality of life. He analyzes the quality of life, both physically and spiritually. Physically, the quality of life is expressed by revenue.

Looking for a job is influenced by the level of earnings, age and education. In turn, the behaviour of migration measures in terms of age and education responds to the search behaviour (Schwartz, 1976).

Mitchell (1989) argues for seeking midrange generalizations on the international relations of migration. He suggests that migration analysis begin with the policy-setting processes of the state.

Zhao (1997) examines the link between migration and education in China. Education has played a significant role in increasing the accessibility of formal employment of urban labour to rural people in the late 1970s and early 1980s. The high urban income has increased the number of high school graduates.

De Haan and Rogally (2002) consider a link between migration and life expectancy, young people with a high life expectancy will be more likely to migrate (Lall, et al., 2006).

Son and Noja (2012) study the determinants of labour emigration and reveal the importance of demographic, geographical and social variables in the analysis of emigration rates. So, they highlight the link between migration and the variables: unemployment, occupation, size and structure of the labour force, working conditions, and education level for 7 EU countries in Central and Eastern Europe, including Romania. The results related the labour market specific variables, inequality with socio-demographic characteristics.

Martiskova (2013) analysed the factors influencing young Greeks' decision to migrate 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 – the education system is not in line with the rising demand for skilled work.

Although the level of international migration and remittances continues to increase, data on international migration remain uncertain. For this, Adams builds a database of 24 large countries on migration and education. Following the analysis, he notes that in terms of legal migration, international migration involves the movement of the educated people. Most migrants, both in the United States and the OECD, have a high level of education (high school or more). For 22 of the 33 countries where estimates of the level of education can be estimated, less than 10% of the most educated (tertiary education) population in the labour exporting countries migrated (Adams, 2016).

Among the most important migration factors analysed in different countries and periods, the unemployment rate, living conditions, health, income, and education level are the most causative.

Although much literature has been written about migration, it is still necessary to study this topic in the light of new economic developments. Considering the powerful impact of the recent economic crisis on all socio-economic phenomena, migration included, we aim to determine the link between migration and several relevant socio-economic variables for EU countries over 2008-2015. We are going to analyse the variation in the number of migrants depending on the unemployment rate, net income, education level and life expectancy in a panel data framework. The analysis is undertaken for 12 EU countries and the investigated period of time is 2008-2015.

2. Data and method

The aim of the study is to test if the determinant factors influence the migration phenomenon, using empirical data on the selected countries and period of time.

The population on which this study was conducted is represented by EU countries for the period 2008-2015. As only some countries have continuity regarding the analysed data, therefore only a sample of 12 countries was included in the analysis.

Most studies have analysed migration in relation to the following endogenous variables: unemployment rate, employment rate, workforce, labour market participation rate of women and men, working conditions expressed in terms of number of hours worked, revenue and education level.

In this study we considered as variables the migration (dependent variable) and the socio-economic factors presented in Table 1 (independent variables).

Table 1. The variables

Symbol	Variable description	Calculation method
MIG	Migration	Total number of emigrants
UR	Unemployment Rate	Unemployment rate (%), age class 15-74
NI	Net Income	Median equivalised net income, Euro
EL	Education Level	Education level (%), age class from 15 to 64, Upper secondary and post-secondary non-tertiary education (levels 3 and 4)
LE	Life Expectancy	Life expectancy, calculatedless than 1 year

The data on these variables were collected for each country for the period 2008-2015 using the Eurostat online database. Migration, the dependent variable, represents the total number of migrants in a country, yearly data, from 2008 to 2015.

We use the panel data regression for the analysis of migration, depending on several socio-economic variables, from a transversal and longitudinal perspective.

A longitudinal study is one that collects data from subjects of the same sample over time. These studies are conducted in a wide variety of contexts and for a wide variety of purposes, but in many situations have considerable analytical advantages over cross-sectional studies or transversal studies. These advantages have been increasingly recognized and appreciated in recent years; the result is an increased number of longitudinal studies. This increase in interest has occurred in the government, academia and private sectors (Lynn, 2009).

A data panel is a set of cross-section data Y_{it} (i = 1,..., n şi t = 1,...,T) obtained on the basis of statistical observation of the variables characteristic of a group of n countries, periodically, within a defined time frame, T (Baltagi, 2005).

In the panel analysis, the following model is considered for estimating the variation of a resultant variable depending on the determinants:

$$y_{it} = b_{0it} + b_{1it}x_{1it} + ... + b_{kit}x_{kit} + w_{it,} \quad (1)$$

with i = 1,...,n and t = 1,...,T, where y_{it} are the values of the resulting variable, x_{kit} are the values of the factor variables, X_k. The value b_{0it} is a constant, and b_{kit} represent the estimates of the coefficients of the variables X_k, recorded for the country at the time t, and w_{it} is the estimated error (Sevestre, 2005).

If the b_{kit} coefficients are equal, the influence of the variables X_k on the resultant variable is constant over time, which describes the existence of a homogeneity at the proposed model level. If the b_{kit} coefficients are not equal, then the pattern is not homogeneous.

Since the number of coefficients (nT (K + 1)) is higher than the total number of observations (nT), the model is difficult to be estimated based on traditional methods, and it is necessary to use contrasts between coefficients. Thus, four canonical models can be defined: fixed effects (individual and transversal), composite errors (random effects), compound coefficients and random coefficients (Jaba, et al., 2013).

The study considers the model with fixed effects, assuming that the influence of factor variables (X_k) on the explanatory variable (Y) is identical for all countries no matter the considered time period ($b_{kit} = b_k$), and the constant (b_{0it}) may be decomposed as follows: $b_{0it} = b_0 + a_i + d_t$, where b_{0it} represents the constant of the regression model, b_0 – a constant, a_i indicates the unobservable differences between countries, ie the individual fixed effects or the individual specificity of a country with regard to the migration phenomenon, and d_t, the temporal differences existing in a country, ie the fixed time effects or the existence of a temporal specificity in a country in terms of migration.

For estimating the impact of the unemployment rate, net income, education level and life expectancy on the probability of migrating in EU countries each year of the period 2008-2015, the following model with fixed effects is employed:

$$Mig_{it} = b_0 + a_i + d_t + b_{1URit} + b_{2NIit} + b_{3ELit} + b_{4LEit} + w_{it,} \quad (2)$$

considering the specifications in the previous paragraphs.

The Hausman statistic is used to test the model with fixed effects. Fixed effect models is applied when the intra-individual variation of variables is superior to inter-individual variation, otherwise is applied the patterns with random effects.

Using the homogeneity test, the coefficients of the studied model are examined in cross-sectional dimension and it is determined whether the model is unique for all studied countries.

If there is heterogeneity it is considered that the use of panel data cannot be justified. To obtain the results of the research, the collected data were analysed with the statistical software SAS 9.4.

3. Results and discussion

The normality of the distribution of the migration phenomenon during 2008-2015 is tested with Kolmogorov-Smirnov (Table 2).

Table 2. Testing the normality of the migration distribution during 2008-2015

	One-Sample Kolmogorov-Smirnov Test: Mig_i							
Year (t)	2008	2009	2010	2011	2012	2013	2014	2015
Kolmogorov-Smirnov Z	0,3389	0,3924	0,3427	0,3566	0,3792	0,4009	0,3908	0,3736
Asymp. Sig. (2-tailed)	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010	<0,010

Source: Own Projection using SAS 9,4

After testing the normality of the distribution, resulted that there are no symmetries compared to the average for the considered period.

A series of descriptive statistics on estimated migration values over the period 2008-2015 are presented in Table 3. As can be seen, the average migration rate has remained stable over time with a slightly increasing trend. The highest values of migration were registered in 2013 and 2014, i.e. 75813 and 67214.83.

Table 3. Migration Descriptive Statistics (Mig) 2008-2015

Analysis Variable: Migration				
Year	Mean	Std. Dev.	Minimum	Maximum
2008	46412,67	79185.08	9144.00	288432.00
2009	55437.33	104406.62	6874.00	380121.00
2010	62536.17	110591.99	5459.00	403377.00
2011	60419.83	112318.39	4812.00	409034.00
2012	65933.75	123059.27	4758.00	446606.00
2013	75813.00	147335.65	4372.00	532303.00
2014	67214.83	110503.19	4052.00	400430.00
2015	65481.25	95225.55	4046.00	343875.00

Source: Own Projection using SAS 9,4

The recorded migration values, Mig_{it} are used for panel data analysis of the migration phenomenon. It is estimated that the influence of migration (Mig_{it}) from a transversal and longitudinal perspective, based on the fixed-effect model, is influenced by unemployment, net income, education level and life expectancy. The main statistical results obtained in SAS 9.4 for the fixed-effects model show that the estimated pattern explains the variation of the resulting variable (migration phenomenon) and the validity of using this model. The main statistics for the fixed-effect model are summarized in Table 4.

Table 4. Statistics on Fixed Asset Model Assessment

Regression model statistics			
Sum of squares of errors	28275908011	Degrees of freedom	73
Mean squares of errors	387341205.6	Root MSE	19680.9859
R square (R^2)	0.9745		

Source: Own Projection using SAS 9,4

Table 4 outlines that the Sum of Squares Errors (SSE) is 28275908011 and the Mean Square of Error (MSE) is 387341205.6, obtained by dividing the SSE to 73 (the number of associated degrees of freedom : 12 countries × 8 years - 23 parameters of the fixed effects model). On the basis of the determination (R-Square), it can be seen that the fixed-effect model obtained by panel analysis explains 97.45% of migration variance and is defined by the unemployment rate, net income, education level and life expectancy.

The study also examines the hypothesis of homogeneity. The results obtained (see Table 5) support the estimation of migration phenomenon based on the unemployment rate, net income, education level and life expectancy in case of fixed effects models.

Since the probability of having a calculated F (Fisher) test statistic higher than its theoretical value is below the theoretical threshold of 0.0001, the assumption of null homogeneity is accepted

at the sample level. This shows that the migration assessment model is unique and representative across all EU countries included in the study (Jaba, 2013).

Table 5. Testing the homogeneity hypothesis based on the F test

Test F for the absence of Fixed Effects			
Number of fixed effects	Degrees of freedom	Test value F	Pr>F
11	73	28,76	<0.0001

Source: Own Projection using SAS 9,4

The results obtained from the estimation of Mig_{it} through the model with fixed effects are presented in Table 6. The estimates values of the regression model, shown in Table 6, reveal that unemployment rate, net income, education level and life expectancy significantly influence the migration phenomenon (for Pr of 10%). Therefore, the regression equation is the following:

$$Mig_{it} = 304495.7 + a_i + d_t + 6264UR_{it} + 0.49NI_{it} + 509.98EL_{it} - 4093.22LE_{it,} \quad (3)$$

Where a_i are the fixed effects determined by the individual dimension of the EU countries (differences between countries in the migration phenomenon), and d_t represent the fixed effects determined by the temporal dimension (differences between years in the emergence of migration in a country).

In Table 6, CS represents the 11 cross sectional fixed effects a_i, determined by the individual size of the country, and TS represents the 8 longitudinal fixed effects d_t, determined by the temporal dimension. Since the use of the model with fixed effects using the Hausman test has been validated, the impact of the unemployment rate, net income, education level and life expectancy on migration (Mig_{it}) is similar for all countries, regardless the period of time (2008, ..., 2015).

For the obtained model, there are 11 (= 12-1) fixed cross effects, ie individual differences between the countries included in the sample (a_i), 1 is insignificant, i.e. Iceland. This indicates a homogeneity of countries from the individual (transversal) perspective: regardless the independent variables, the countries are facing migration.

According to the results summarized in Table 6, it can be noticed the existence of significant individual effects in the Iceland case. This country has significant individual effects different from the rest of the countries, whose individual fixed effects are insignificant. Iceland shows 287402.6 more migrants than the other countries in the sample. For countries with insignificant fixed effects it can be noticed that there are no big differences regarding the number of migrants.

From the analysed variables, only the unemployment rate is statistically significant. The same conclusions we find at Son and Noja (2012) in the panel analysis of EU migration.

The migration decision is the result of a process by which the rational individual assesses the benefits of international migration, the most important being the financial one. In our case, the net income is not statistically significant. One explanation could be that the analyzed countries differ in terms of income. A positive effect is that people are not only guided by income levels when they decide to migrate. They are also interested in other factors, or the income level in their country is high enough not to determine them to migrate.

The education variable refers to levels 3 and 4 of the studies. As it is not significant, an explanation might be that the number of those with this level of education is not so big or they do not occupy a position consistent with this level in the country they are migrating. This creates negative effects for those who accept a sub-qualification, but also a positive effect by discouraging the departure of qualified people.

Life expectancy variable is also statistically insignificant. Although it is inversely proportional to the intention to migrate, it seems that it is not so small that people want to migrate. Although other studies emphasize a link between migration and life expectancy, in our case, this is not important for the emigration decision.

Table 6. Estimates of the regression parameters obtained with the analysis of the panel data of the migration phenomenon during 2008-2015

Variables	Estimate	T Value	Pr>|t|	Variables	Estimate	T Value	Pr>|t|
CS1	-87747.4	-1.66	0.1005	Unemployment	6264.00	5.16	<0.0001
CS2	-5816.27	-0.23	0.8205	Net income	0.49822 5	0.43	0.6670
CS3	-40899.5	-2.5	0.0147	Education	509.9821	0.24	0.814 7
CS4	-59521.4	-0.86	0.3911	Life expectancy	-4093.22	-0.41	0.6861
CS5	-22429.6	-0.85	0.3987	TS1	2835.08	-0.16	0.873
CS6	51125.47	2.83	0.0060	TS2	-9473.37	-0.63	0.529
CS7	-60478.2	-0.71	0.4792	TS3	-8331.75	-0.63	0.532
CS8	-28193.4	-1.43	0.1570	TS4	-9380.87	-0.9	0.3726
CS9	-5204.65	-0.29	0.7731	TS5	-6386.43	-0.68	0.5008
CS19	-42690.6	-1.60	0.1140	TS6	2409.028	0.28	0.7795
CS11	287402.6	5.14	<0.000 1	TS7	-1738.09	-0.21	0.8339
Intercept	304495.7	0.35	0.7285				

Source: Own Projection using SAS 9,4

In the case of temporal fixed effects estimated in the regression model, i.e. the longitudinal differences in the time points included in the study (d_t), no significant differences are observed

during the time. It can be concluded that the time factor does not have a significant influence on the migration phenomenon. This means that the analyzed period was homogeneous in terms of the variables analyzed, no significant changes occurred.

5. Conclusions

The statistical results revealed by our study using panel data analysis point to the model with fixed effects as statistically relevant for the migration phenomenon in EU.

The results indicate that at EU level the migration phenomenon can be explained by the socio-economic variables considered in the analysis. Although the panel analysis considers data from both transversal and longitudinal perspective, we can deduct that the cross-section has a greater influence on this case.

From the analyzed variables, only the unemployment rate is statistically significant. This conclusion we find it at Son and Noja (2012) in the panel analysis of EU migration.

The migration decision is the result of a process by which the rational individual assesses the benefits of international migration, the most important being the financial one. In our case, the net income is not statistically significant. One explanation could be that the analyzed countries differ in terms of income. A positive effect is that people are not only guided by income levels when deciding to migrate. They are also interested in other factors or the income level in their country is high enough not to determine them to migrate.

Variable education refers to levels 3 and 4 of the studies. As it is not significant, an explanation might be that the number of those with this level of education is not so big or they do not occupy a position consistent with this level in the country they are migrating. This creates negative effects for those who accept a sub-qualification, but also a positive effect by discouraging the departure of qualified people.

Life expectancy variable is also statistically insignificant. Although it is inversely proportional to the intention to migrate, it seems that it is not so small that people want to migrate/ In our case it is not important for the emigration decision.

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 regional level in Romania.

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