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**Article**

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## MOBILITY IN EUROPE: RECENT TRENDS FROM A CLUSTER ANALYSIS

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### Abstract

During the past decade, Europe was confronted with major changes and events offering large opportunities for mobility. The EU enlargement process, the EU policies regarding youth, the economic crisis affecting national economies on different levels, political instabilities in some European countries, high rates of unemployment or the increasing number of refugees are only a few of the factors influencing net migration in Europe. Based on a set of socio-economic indicators for EU/EFTA countries and cluster analysis, the paper provides an overview of regional differences across European countries, related to migration magnitude in the identified clusters. The obtained clusters are in accordance with previous studies in migration, and appear stable during the period of 2005-2013, with only some exceptions. The analysis revealed three country clusters: EU/EFTA center-receiving countries, EU/EFTA periphery-sending countries and EU/EFTA outlier countries, the names suggesting not only the geographical position within Europe, but the trends in net migration flows during the years. Therewith, the results provide evidence for the persistence of a movement from periphery to center countries, which is correlated with recent flows of mobility in Europe.

**Keywords:** mobility/migration, cluster analysis, migration patterns, sending/receiving countries.

**JEL Classification:** J61, F22, C38, R23

### Introduction

In the context of an enlarged Europe and an increasing globalization, youth mobility raises more and more interest for both academics and policy makers. The European Union's vision for youth is based on two approaches: investing in youth and therefore allocating enhanced resources towards developing certain domains within youth policies, and empowering youth, meaning the promotion of youth potential for renewing society and

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contributing to the EU's values and objectives, with special attention paid towards young people with fewer opportunities.

Despite strong efforts, the cross-border mobility rates of young people in Europe are still comparably low. In this context, the paper focuses European cross-border mobility of young people within the frame of the Horizon 2020 research project: MOVE "Mapping mobility – pathways, institutions and structural effects of youth mobility in Europe". The central questions of MOVE are how mobility of young people can be 'good' both for socio-economic and individual development of young people, and what are the factors that foster/hinder such beneficial mobility? The paper is based on the macro-economic analysis conducted in work package 2 of the MOVE project "Sampling and secondary analyses of macro data of youth mobility in Europe and the partner countries", which were presented in the final work package report (Hemming, Tillmann and Reißig, 2016).

The objective of the paper is to analyse country patterns for mobility using socio-economic macro-data. The classification is produced with correlation and cluster analysis, using macro data for a nine years period, between 2005 and 2013. Following the theory developed by Immanuel Wallerstein (1974), the set of variables used for country cluster analyses covers social and economic aspects at the macro level. Considering the obtained clusters, changing patterns of mobility for EU28/EFTA countries will be analysed. The novelty of the papers therefore lies in providing country patterns and in elaborating the classification of European countries related to mobility, in a dynamic approach covering almost a decade. Another significant contribution of the paper is also verifying and validating the Wallerstein theory in recent decades, by using macroeconomics indicators, associated to push and pull migration factors. Macroeconomic indicators have limited power in explaining social phenomena, such as migration, in the literature dedicated to migration these kind studies being usually based on microeconomics data.

The structure of the paper is as follows: In the second section the state of the art related to migration is described related to respective theoretical approaches. In the third section applied methods, research hypotheses, included indicators and statistical procedures are reported. The fourth section descriptive statistics are presented, followed by the synthesized results in section five and the conclusion in chapter six.

## 1. Literature review

Interregional differences stimulate people migration<sup>2</sup> in general and people mobility within Europe, in particular. The nature, causes and intensity of migration represent the main focus of a series of contemporary theoretical approaches, emerging from complex processes and conditions such as: the hard-economic crisis, intensified monopoly domination, a rise of economic inequities among capitalist countries, as well as an increasing economic gap between developed countries and developing ones. In their extensive work, Bauer and Zimmermann (2002) selected the most relevant theories and applications in economics of

<sup>2</sup> Following the theoretical framework of MOVE the term "mobility" is used in line with "migration" when talking about geographical cross-border movements of young people in Europe independently of the duration of the movement. Thus, in this paper it is not differentiated between mobility and migration.

migration, while more recently Kurekova (2011) provided a synthetic description of migration theories.

The world system theory assumes that migration cannot be explained outside the context of globalization. The main concepts of the world system theory are exposed in Wallerstein's book "The Modern World System: Capitalist Agriculture and the Origins of the European World Economy in the Sixteenth Century" (1974); which are the role, the dependence and the development degree. The concept of „role“ refers to the structure of one country's relations to another country and to the international division of work; „dependence“ is the degree of vulnerability of one state at the system changes, while the „development degree“ is influenced by both the role as well as the dependence. Presumably, both role and dependence have effects on the economic performance, interacting with capital and labor mobility.

In his analysis of the modern world economy, Wallerstein also introduced the concepts of *centre and periphery*. These two concepts - relevant for the current paper - were also associated with the information economy by Hannerz (1992), who showed that some economic and technical activities remain in the central countries such as research and development, activities determining global business policies, information technology related activities, and higher education activities. For example, students' mobility showed clearly visible centre-periphery patterns. The process could be described geographically, it concerns certain countries and certain cities and campuses within these countries (Salt and Miller 2006).

Recent evidence in explaining migration through the concepts of centre and periphery also referred to the transfer of human capital from peripheral to central labor markets. Literature presenting the effects of migration on labour markets is extensive and rapidly growing. The majority of studies, while using macro-economic models of aggregate supply and demand for labour, showed that migration affects wages and employment (Battisti et al., 2014; Borjas, 2015; Ottaviano and Peri, 2012). The competition between natives and migrants on the labour market was subject to various studies. Borjas (1987) proved that increasing the immigrants labour supply impacts the natives' wages, while Mayda (2006) argued that natives feel threatened by the migrants' competition on the labour market. Balaz et al. (2004) studied the implication of youth brain drain for the countries of origin starting with the case of Slovakia. They proved a substantial loss of graduate workers from the labor force through migration, while accounting for a potentially significant proportion of Gross Domestic Product growth.

Different theories on migration present specific components of the determinant factors. Economic factors and existing differences between economic development level in various countries are among the most described in the literature, but there are also analysed social and administrative component. Jennisen (2004) argued that social component is directly linked to demographic factors and variations in the population structure, affecting the migration process. Borjas (1999) showed that welfare system acts as a magnet for the migrants in their searching for a better life, while Saeedian et al. (2016) analysed the effects of visas on geographical shape of populations.

There are recent approaches that connect geographical distribution of migration with factors such ideological beliefs (Vitankov, Ausloos and Rotundo, 2012) or migration networks (Vitankov and Vitanov, 2016). Some authors used cluster analysis for analysing

geographical patterns of migration. For instance, Akın and Dökmeci (2014) highlighted spatial patterns of inflows and outflows of migration among different regions in Turkey, pointing out that each country might have different patterns of interregional migration depending on its socioeconomic conditions and technological levels. The cluster analysis of interregional migration revealed a hierarchical pattern of a large cluster at the level of the country. Evidence for specific youth mobility fields is mostly related to international student mobility (González, Mesanza and Mariel, 2011; Roman and Suciu, 2007). However, King et al. (2016) recently described the “interactions of young people’s European mobility with several youth life transitions”, such as from “youth” to “adulthood” or from education to work.

The academic interest in studying various mobility types and patterns was strongly supported by the political interest of the European Union. Starting in 2001, when “The White Paper of the European Commission” (2001) was published, a new framework for cooperation was established among the various actors in the youth field in order to better involve young people in political decisions concerning them. The White Paper requested for EU and national policies to take more account of the needs of young people. The most relevant policies refer to employment, social integration, fight against racism and xenophobia, education, lifelong learning, and mobility. Young people are the demographic sub-group being most mobile (Roman and Vasilescu, 2016). Thus, youth are the ones raising more and more interest for both academics and policy makers in terms of migration research. In April 2009, the Commission presented a new document titled “An EU Strategy for Youth: Investing and Empowering - A renewed open method of coordination to address youth challenges and opportunities”. A strategy is suggested for future policies in the European youth area aiming at empowering young people to face several current challenges: education, employment, social inclusion, and health.

As there is a lack of a comprehensive model of mobility/migration, taking all reasons and consequences into consideration (Hárs, 2009), a heuristic causal mobility model was developed for the macro-analysis within MOVE. The model provided a set of potentially relevant macro-indicators which were considered for the compilation of the MOVE-Scientific Use File (Hemming, Tillmann, and Dettmer 2016). Also, the heuristic model served as a basis for the development of background models explaining causes and effects of youth mobility. Therefore, macro-economic indicators – as potential push- and pull-factors for European youth mobility – were considered in three sectors: institutional, social, and educational variables (Tillmann, Skrobanek and Hemming, 2016)

Studying the social and economic differences between various regions and countries in Europe is of high relevance for understanding youth mobility from a macroeconomic perspective. The macro-approach is not highlighted so far in the literature, at the same time, recent dynamics of mobility in Europe deserve further explanation, also from a macro perspective. Responding to this need, the paper contributes to the development of the current literature in the field of mobility within the EU.

## 2. Method and data

Cluster analysis relies on a high-level descriptive method to form groupings of cases (i.e. counties) that are similar across a profile of variables (Gunderson, Pinto, and Williams 2008), so the pre-selection of variables is of great important. Cluster analysis is known as

segmentation or taxonomy analysis and it is used in data mining. It attempts to identify homogenous groups of cases (observations, participants, respondents). The goal of clustering is descriptive, that of classification is predictive. Being an explorative analysis it does not make any distinction between dependent and independent variables. Most of the available econometric software packages include three different clustering methods: K-means cluster, hierarchical cluster, and two step cluster. The following analysis is based on K-means cluster - especially suitable for large data sets. While using this method, the number of clusters needs to be specified in advance. Thus, it can be useful for testing models with different numbers of clusters.

The starting hypotheses for the current cluster analysis refer to the centre and periphery model used by Wallerstein (1979, 1991) and Kahanec and Zimmermann (2010). Both imply that high rates of mobility can be explained by a complex set of push and pull factors, including the economic situation in sending and receiving countries. Based on the centre-periphery model, the linkage between mobility-patterns and socio economic framework conditions will be made with the analysis of the crude rate of net migration. According to the centre-periphery model, three clusters are hypothesised:

- Typical receiving countries will assign to one cluster, offering similar socio-economic conditions for incoming mobility. These countries are assumed to be located in the centre of Europe. For these countries, the crude rate of net migration is assumed to be positive.
- Typical sending countries assign to another cluster offering similar socio-economic conditions for outgoing mobility. They are assumed to be located at the European periphery. For this group of countries, the negative crude rate of net migration is assumed.
- The third cluster is assumed to consist of outliers (e.g. small countries, non-EU-countries).

The aim of the presented cluster analysis is to reveal if the assumed patterns could be confirmed or if new trends/patterns could be found. The data basis for the cluster analysis was compiled during the MOVE project in a Scientific Use File on “Youth mobility macro data for Europe” (see Hemming, Tillmann & Dettmer, 2016), based amongst others on EUROSTAT, OECD and World Bank data for EU28/EFTA countries. The MOVE-SUF was set up with data from all EU-28 and 3 EFTA countries (Switzerland, Iceland and Norway), with a total of 31 country-cases. It covers a core period of 10 years (2004-2013). For some indicators data for 2014 were provided additionally. The analysis was performed for selected years, reflecting the whole observed period: 2005, 2007, 2009, 2011, 2012, and 2013. Following the heuristic macro-theoretical model on youth mobility, for the cluster analysis, the most relevant indicators of the sectors state, society, and economy were selected:

- Economy: youth unemployment rate, GDP per capita in purchasing power standards (PPS);
- State: expenditure on social protection, GINI Index, at risk of poverty;
- Society: HDI, urban population, fertility rates, population density, infant mortality rate, and expenditure on pensions, youth population, and ratio of total emigration.

Some of the indicators, that were analysed in the first round of cluster analysis revealed to be ineffective in determining the clusters. This was the case, if the majority of included

countries were assigned to the same cluster. It applied for the following indicators: youth population, and ratio of total emigration. Also, a correlation analysis between the variables was performed proving that there are no statistically significant correlations.

The final set of indicators considered for the analysis consists of: youth unemployment rate, GDP per capita in PPS, expenditure on social protection, GINI Index, at risk of poverty, HDI, urban population, fertility rates, population density, infant mortality rate, and expenditure on pensions. Additionally, the indicator “crude rate of net migration” was included in the further steps of the analysis. “Net migration plus statistical adjustment” is defined by EUROSTAT as “the difference between total population change and natural change”, while „crude rate of net migration” is defined as „the ratio of net migration plus adjustment during the year to the average population in that year, expressed per 1 000 inhabitants”.

### 3. Descriptive statistics

A summary of the descriptive statistics is presented in the Table no. 1, while a detailed description of variables’ definitions and sources is provided in Hemming, Tillmann and Dettmer, 2016.

**Table no. 1: Summary of the descriptive statistics**

	<b>Mean in 2007 (EU-28+NO)</b>	<b>Mean in 2014 (EU-28+NO)**</b>	<b>General trend</b>	<b>Countries with low ratios</b>	<b>Countries with high ratios</b>
Youth unemployment rate (% of 15-24 year-olds of youth labour force)	14.72	23.28	Increasing until 2013, then decreasing	DE, NO, AT, MT, SE	EL, HR, ES
GDP per capita in PPS	25472 EUR/capita	27562 EUR/capita	Decreasing in 2009, then increasing constantly	East European Countries	LU, NO, IE
Expenditure on social protection (% of GDP)	21.69	24.25*	Varying	East European Countries	FI, EL, FR, DE, DK, SE
Gini index	29.4	30.1	Small increase	NO, BE, CZ, FI, SI, SE	East European Countries, and Spain
At risk of poverty (% of total population)	15.7	16.6	Small variations	No, CZ, FI, FR, SK	RO, ES, BG, EE, EL, LV
Human Development Index (status quo from 15 <sup>th</sup> August 2015)	0.849	0.860*	Small increase	RO, ES, SK, SI, SE, UK	AT, BE, BG,
Urban population (% of total population)	72.22	73.371	Constantly increasing	Si, SK, RO,	BE, MT, NL, DK, LU

	Mean in 2007 (EU-28+NO)	Mean in 2014 (EU-28+NO)**	General trend	Countries with low ratios	Countries with high ratios
Fertility rates	1.56	1.53*	Constantly decreasing since 2008	ES, PT, HU	IE, NO, BE, SE, UK
Population density (Persons per km <sup>2</sup> )	163.5	168*	Increasing	Nordic States	MT, DE, LU, BE, NL
Infant mortality rate ( per 1000 live births)	4.68	3.81*	Decreasing	RO, BG, MT, SK, PL	ES, CZ, EE, FI, IT, PT, SE
Expenditure on pensions (% of GDP, current prices)	9.32	10.95*	Increasing	IE, RO, NO, LT, SK	IT, EL, PT, AT
Crude rate of net migration	3.4	1.3	Varying	CY, LV, LT	LU, DE, NO

Note: \*Values registered in 2013

\*\* The EUROSTAT abbreviations for countries are used. CH and IS were excluded from the analysis because of the missing data

The highest increase of the youth unemployment rate between 2004 and 2014 was observed for Spain (31.20%), followed by Greece (25.88%). The highest decrease on the contrary was monitored in Poland with 16.98%. In Romania and Luxembourg, the youth unemployment rate was stable, decreasing with only 2.73% in Luxembourg and 2.13% in Romania. The GDP per capita in PPS varied strongly between the countries in 2004 from 2,700 EUR per capita in Bulgaria to 60,300 EUR per capita in Luxembourg. The same happened in 2014 when it varied from 5,900 EUR per capita in Bulgaria to 87,600 EUR per capita in Luxembourg. The highest increase between 2004-2014 was registered for Romania with 158%.

In 2007, the average GINI index was about 31.36 years, while during 2009-2012, the same average indicator slightly declined to 30.9 and then improved, reaching 31.14. The variation within the sample is low, the country GINI indexes range between 23.72 (Slovenia 2008) and 37.61 (Romania 2007). The highest average GINI level was found for Portugal (36.09), Latvia (35.58) and Spain (35.31), whereas the lowest average rates characterized Slovenia (24.72), Czech Republic (26.27), and Norway (26.48).

As one can see from the Table 1, a huge variability of the average population density was captured, mainly due to the demographic and especially geographic particularities of the single countries. A contrast was found between the north and the south with the Nordic states having the lowest population density whereas the highest average level of density is assigned to Malta. During the period of 2007-2014 the infant mortality rate showed a decreasing trend in all EU countries, except for Denmark and Sweden. The highest ratios were found for Romania and Bulgaria, the lowest for Cyprus. In 2013, the highest share of expenditure on pensions was monitored in Greece (16.7) and Italy (16.5). The lowest shares were found in Ireland (6.8) and Lithuania (7.2). In almost all captured countries the trend was ascending, except for Germany and Poland, whereas in Hungary the shares varied over time.

#### 4. Results

The cluster analysis was performed using the 10 selected indicators with standardized and un-standardized variables. A standardized z-score is a variable that has been rescaled to have a mean of zero and a standard deviation of one. Variables are standardized for contributing evenly to a scale when items are added together, or to make interpretations of the results easier (e.g. regression). As stated above, the analyses were performed for different years: 2005, 2007, 2009, 2010, 2011, 2012, and 2013, to see if the analysed clusters were persistent over time. Firstly, the analyses were conducted biyearly. But as the results revealed major effects of the economic crisis, the analysis was repeated for 2010 and 2012.

Additionally, to the range of years and the standardizes/unstandardized models, analyses were conducted including and not including small countries (Luxembourg, Malta, Norway, and Cyprus). This was done in line with the convention of macro-analyses in research on poverty, suggesting that macro-analyses on national level should only include countries with a minimum of 2 million inhabitants to avoid a modelling bias caused by special conditions of small countries (Sachs 2005). Thus, the different models were conducted for testing if the obtained results differ significantly from each other as a function of included small countries.

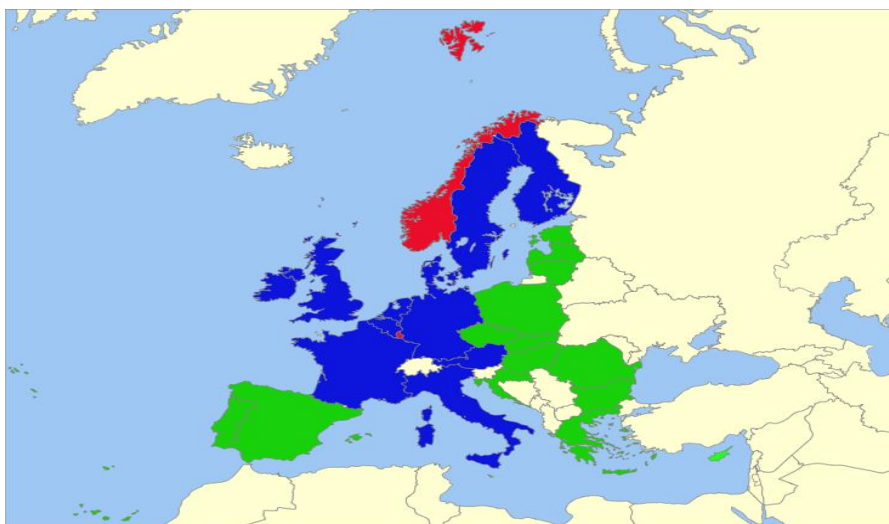
Conduction the analyses with un-standardized variables, the clusters revealed more stable while Luxembourg and Norway were identified as outliers. With standardized variables, the only outlier was Malta. If all captured small countries were excluded from the analysis (Luxembourg, Malta, Cyprus, and Norway), the clusters were not affected by un-standardized variables, but the distances between the clusters were. Thus, the un-standardized cluster solution was chosen. The obtained clusters were persistent over time with some exceptions (see Annex). In 2010, Spain moved from the first cluster into the second one, mainly due to the economic crisis and the therewith linked increasing rate of youth unemployment, and a reduction in GDP per capita (Elteto, 2011). Accordingly, Spain has changed in the last years its migration flow from being sending country to becoming a receiving country (Izquierdo, Jimeno, and Lacuesta, 2016). For the years 2012 and 2013 the results of the unstandardized and standardized models did not differ significantly, thus the unstandardized cluster solution was chosen.

The results are in accordance with the above presented hypotheses and are illustrated in Figure 1. To the *first cluster* assign the receiving countries, which are characterized by low levels of youth unemployment rates, high levels of GDP per capita in PPS, high expenditure on social protection, low levels of GINI index, low rates for the risk of poverty index, low levels of HDI, a high population density, high fertility rates, and high expenditure on pensions, which are: Germany, Austria, Belgium, Denmark, Finland, France, Ireland, Italy, Netherland, Sweden, and United Kingdom., : Geographically, these countries are located in the centre of Europe and are highly economically and socially developed. The name of the first cluster is *EU/EFTA centre-receiving countries*. The cluster revealed to be persistent over time with none of the countries assigning to one of the other clusters over the observed period.

For the countries in the *second cluster* youth unemployment rates, GINI index, and share of people at risk of poverty were higher, whereas GDP per capita in PPS, expenditure on social protection, population density, fertility rates, and expenditure on pensions were lower

compared to the first cluster. To the second cluster, countries from Eastern Europe (Hungary, Romania, Estonia, Bulgaria, Croatia, Czech Republic, Latvia, Lithuania, Slovakia, and Slovenia), as well as Spain, Greece, and Portugal were assigned to. The name of the second cluster is *EU/EFTA periphery-sending countries*. Except for Spain, which assigned to this cluster only since 2010 (switching from the first to the second cluster), all other countries were persistent over time.

In the third cluster, Norway and Luxembourg were grouped together as outliers – named *EU/EFTA outlier countries* – having a GDP per capita almost 2.5 times higher compared to the first cluster, and a youth unemployment rate more than 2 times lower compared to the second cluster.

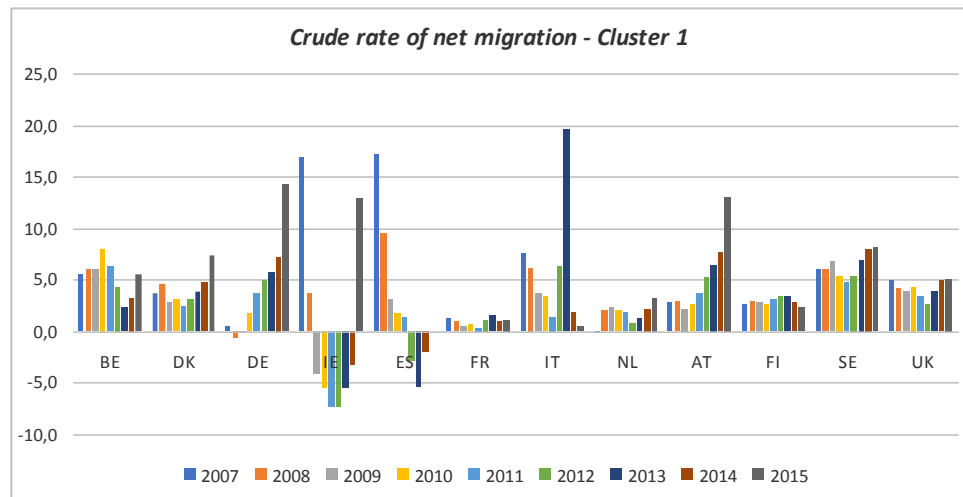


**Figure no. 1: Solution with three clusters for EU28/EFTA countries**

*Source: authors*

For testing the third hypothesis, the indicator “crude rate of net migration” was used for mapping mobility flows in EU-28/EFTA countries. The indicator was chosen because no comparable youth mobility indicator was available for EU28/EFTA countries on the macro-level. The countries grouped in the first cluster (EU/EFTA centre-receiving), except Ireland (since 2010) confirm the hypothesis that are receiving countries, as the next figure shows.

Spain was included in the first cluster prior to global financial crisis. Post crisis, it was included in the second cluster, confirming the changes of migration flows in Spain (Izquierdo, Jimeno, and Lacuesta, 2016). However, despite the economic turbulences, Spain remained an attractive destination for Romanian people. The Romanian migration surpassed in 2007 those of Moroccans with forming the largest foreign group in this country. Also, Spain remained an attractive destination for European youth mobility, especially as finished outgoing/returning mobilities to Spain mostly refer to short-term students’/touristic mobilities (Hemming, Tillmann and Reißig, 2016).

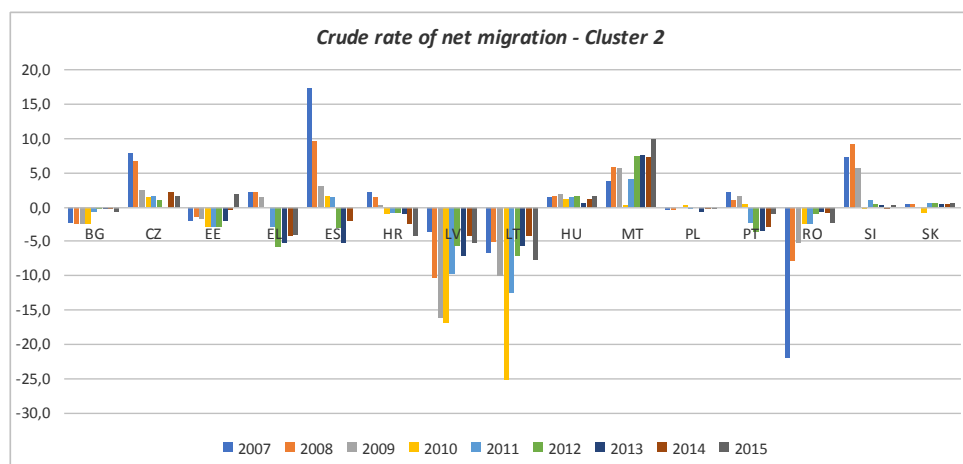


**Figure no. 2: Crude rate of net migration in EU/EFTA centre-receiving cluster**

*Source: authors*

When comparing the above-mentioned tendency with the cluster results, it reveals that all countries in the first cluster are typically receiving countries, except for Ireland, showing an opposite characteristic between 2009-2015, although being a typically receiving country before. However, as Ireland is situated at the periphery of Europe from a geographic perspective, the result is not surprising and in line with the considered hypothesis. Also, the receiving characteristic was more relevant during the economic crisis, stressing the fact that socio-economic conditions play an important role in migration. In France, the net balance is comparably low. However, when considering youth mobility, France shows an opposite characteristic (Hemming, Tillmann and Reißig, 2016). The highest net balance was registered for Italy in 2013. For Austria, the crude rate of net migration revealed an increasing tendency lately.

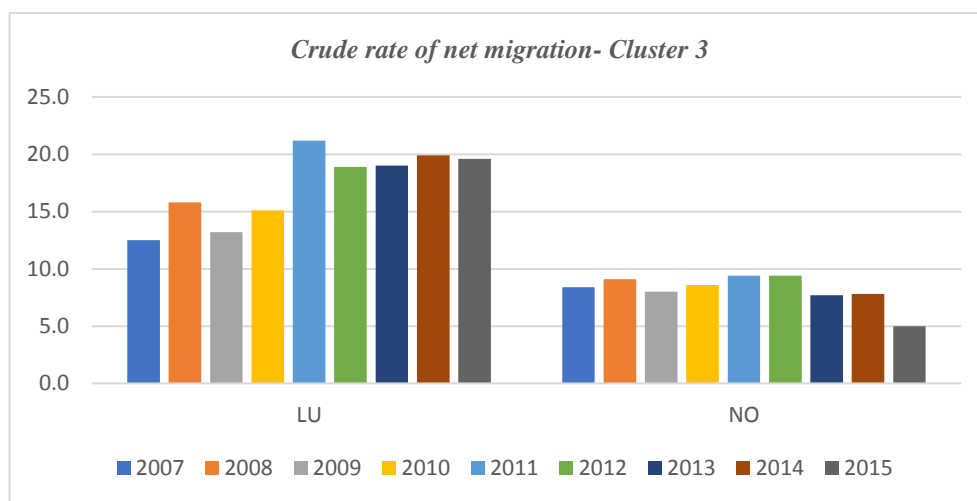
In the second cluster (*EU/EFTA periphery-sending countries*) the situation is different. Some countries confirm the hypothesis, such as: Bulgaria, Estonia, Greece, Croatia, Latvia, Lithuania, Portugal, Romania, and Poland. On the contrary other do not, such as: Czech Republic, Malta, Hungary, and Slovenia. Also, recently, Estonia, Slovenia, and Slovakia changed their trajectory like Spain. The net balances for Hungary, Slovakia, Slovenia, and Poland were comparably low, but showing a tendency of sending countries in some years. Romania, being one of the newest EU member states, sent a lot of people to Italy and Spain, which is related to cultural and language similarities, as well as networks. More recently however, the trend changed to sending more educated people to UK. Taking the upcoming Brexit negotiations into consideration, it might change again. Figure no. 3 highlights the trends for the countries assigned to the second cluster.



**Figure no. 3: Crude rate of net migration in EU/EFTA periphery-sending cluster**

*Source: authors*

The outlier countries-(Norway and Luxemburg), showed a peak of their crude migration rate during the economic crisis (see Figure 4). Both countries are well developed typical receiving countries. As the cluster analysis was performed using socio-economic data, the country characteristic could be expected afore.



**Figure no. 4: Crude rate of net migration in EU/EFTA outlier countries**

*Source: authors*

When comparing the result with the cluster analysis, one can find both similarities and differences. The overall cluster solution is in accordance with the expected countries' crude rate of net migration, except for Ireland, which strengthens the central hypothesis on the centre-receiving and periphery-sending countries. The result is also in line with the findings

of Kahanec and Zimmermann (2010), who stated that the economic situation in sending and receiving countries is relevant for migration patterns.

## Conclusions

Between 1990-2005, studies about European mobility and migration were strongly related to East-West migration, whereas recent literature reflects new patterns and forms of migration. These are mainly due to the EU-enlargement process and the economic and demographic changes within EU member states. Also, the key aims of the EU-Youth Strategy focus on the integration of young migrants into the respective host countries, and encouraging young people to participate at EU-programmes like Erasmus+, Inclusion and Diversity Strategy, EVS, youth exchanges.

Accordingly, based on a cluster analysis of macroeconomic indicators (for the period 2005-2013), the paper intended to identify new trends in European migration. Performing several variants of cluster analyses (standardized/unstandardized variables, including all or only selected indicators), the conclusions were in line with the developed hypotheses and confirmed them. The captured European countries were assigned to three clusters: first cluster - EU/EFTA centre-receiving countries; second cluster – EU/EFTA periphery-sending countries; and third cluster – EU/EFTA outlier countries.

The research performed in the paper is relying on macroeconomic variables, which could imply some limitations. Although initial data set consisted in a large number of variables, because of the missing data this was reduced, allowing however for the explorative approach of the current research. The migration intention is usually based on personal reasons that could not be captured by macroeconomic variable, so it would be difficult to interpret the results and to draw conclusions beyond the macroeconomic level. Such conclusions should be considered research hypothesis that would deserve further analysis.

The results also confirm the trends of migration flows within Europe. Overall, the indicator “crude rate of net migration” is positive for countries belonging to the first cluster for the observed period, and negative for countries from the second cluster. A possible explanation for the few exceptions could be found in related factors characterizing the origin/destination countries such as linguistic similarities, cultural richness, socio-political stability, the development of IT-infrastructure and the allocation of human resources (as described by Bologna and Lupu, 2017), the existence of social networks. However, in some cases (Ireland, Czech Republic, Hungary, Slovakia, Slovenia) the obtained results could also explain some new patterns of migration pattern. For instance, Ireland, geographically located at the periphery of Europe, could be also seen as a sending country. However, mobility and migration is strongly linked to socio-economic conditions, which was shown in the results for the period following the economic crisis. A further interpretation referring to the country patterns suggest, if socio-economic conditions change leading towards smaller differences between the countries, analysed mobility patterns could become more evident, pointing to the fact, that mobility and migration follows the centre-periphery pattern.

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#### Annex 1: Results of the cluster analysis by countries

Country	2013	2012	2011	2010	2009	2007	2005
DE	1	1	1	1	1	1	1
HU	2	2	2	2	2	2	2
LU	3	3	3	3	3	3	3
NO	3	3	3	3	3	3	3
RO	2	2	2	2	2	2	-
ES	2	2	2	2	1	1	1
AT	1	1	1	1	1	1	1
BE	1	1	1	1	1	1	1
BG	2	2	2	2	2	2	-
HR	2	2	2	2	-	-	-
CZ	2	2	2	2	2	2	2
DK	1	1	1	1	1	1	1
EE	2	2	2	2	2	2	2
FI	1	1	1	1	1	1	1
FR	1	1	1	1	1	1	1
EL	-	2	2	2	1	2	2
IE	1	1	1	1	1	1	1
IT	1	1	1	1	1	1	1
LV	2	2	2	2	2	2	2

Country	2013	2012	2011	2010	2009	2007	2005
LT	2	2	2	2	2	2	2
MT	2	2	2	2	2	2	2
NL	1	1	1	1	1	1	1
PL	-	2	2	2	2	2	2
PT	2	2	2	2	2	2	2
SK	2	2	2	2	2	2	2
SI	2	2	2	2	2	2	2
SE	1	1	1	1	1	1	1
UK	1	1	1	1	1	1	1

**Annex 2. List of macro indicators used in the analysis** (for definitions and source of data see also Hemming, Tillmann & Dettmer, 2016)

Variable Label	Unit
Youth unemployment rate (% of 15 – 24-year-olds of youth labour force)	%
GDP at market prices (EURO per capita)	EUR/capita
Expenditure on social protection (% of GDP)	%
Gini coefficient of equivalised disposable income (number)	Gini coefficient
At-risk-of-poverty rate (% of total population)	%
Human Development Index Version 1 (status quo from 15th August 2015)	HDI
Urban population (% of total population)	%
Fertility rates (total number, children/woman)	Children/Women
Population density (Persons per km <sup>2</sup> )	Persons per km <sup>2</sup>
Infant mortality rate (ratio per 1000 live births)	%
Expenditure on pensions (% of GDP, current prices)	%
Crude rate of net migration plus adjustments	%