THE INTERNATIONAL MIGRATION WITHIN THE EUROPEAN UNION ON THE NUTS 2 LEVEL

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Abstract

Migration can be examined from different point of views, as it is affected by a combination of several factors as e.g. economic, social and political. Migration projections are based, inter alia, on subjective assumptions that may or may not occur. For example, in 2004, it was assumed that economic disparities between EU-15 and new associate states will lead to noticeable unwilling migration within the European Union. Restrictive measures on free movement of labour have been introduced to avoid the fulfilment of this assumption. The results allow us to express hypothesis that foreign immigrants are partly moving into locations vacated by domestic emigrants. This means, among other things, that foreign immigrants do not necessarily mean competition for domestic workers. The object of our examination is also correlation between the number of migrants and disparities between regions, which are caused by migration and also correlation between migration and the real risk of poverty – i.e. the proportion of people whose income is below 60% of median disposable income in the country, as the one from possible social factors which can influence the migration.

Key words: migration, Gumbel Max probability density function, crude rate of net migration plus statistic adjustment, people at risk of poverty

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Introduction

Migration affects as countries of origin so destination countries for ages. It is very important studying field as at the country, so at the regional level. We are examining trends in international migration at the regional level in this paper and concretely we examine trend in the number of migrants, trend in the disparities between regions and also the correlation between number of migrants and disparities between regions. We are also identifying regions with negative and positive values of crude rate of net migration (hereinafter CRN) plus statistical adjustment and analysing the correlation between CRN and percentage of people at risk of poverty.

We would like to mention some researchers who deal with international migration. For example, Fuller and Martin (2012) analyse factors shaping new immigrants' month-by-month employment trajectories over their first 4 years of settlement. These trajectories are treated as multidimensional and holistic entities and authors predict the correlates of a set of typical pathways identified via optimal matching techniques and cluster analysis. Lehmer and Ludsteck (2011) deal with wage gap in Germany. They compared male foreign workers from different East and West European countries who entered the German labour market between 1995 and 2000 with those of male German workers. From their results from Oaxaca/Blinder type decompositions is obvious that the East Europeans are not generally worse off. Constant and Zimmermann (2012) examined the circular migration between the host and home countries using panel data for Germany, distinguishing between factors generating single moves, circular migration and absorption. From their results is evident that migrants leave less likely when they have job in Germany and speak the language well. On the other hand, they are more likely to leave early after their first arrival in Germany and when they have social and familial bonds in the home country. Bijak (2008) presented an overview of the existing methods in international migration forecasting and proposed an alternative based on the Bayesian statistics, combining the formality of inference with the subjective expert opinion. He predicted long-term migration between Germany and Poland for period 2004–2010. Fratesi and Riggi (2007) created model which confirm that skill-selective migration can, in some cases, lead to increasing income per capita disparities and, for this reason, policy makers need to pay attention when attempting to narrow regional disparities by easing interregional migration.

1 Materials and methods

Our examination will not be able without monitoring of different research studies from journals and books available in some scientific databases. The statistical data are from Eurostat.

The main aim of this paper is to analyse the international migration within the European Union at NUTS2 level. We work with crude rate of net migration (CRN) plus statistical adjustment which represents ratio of net migration plus adjustment during the year to the average population in the same year, expressed per 1 000 inhabitants. The net migration is the difference between the total gross rate of total change and the gross rate of natural change of the population. From this point of view, net migration is part of the movement of

the population, which was not caused by death or birth (Eurostat, 2012). The number of analysed territorial entities at NUTS 2 level is from 255 to 292. It depends on the concrete year, as data of some regions were missing. The number of territorial entities at the same level is 128 in the cause of poverty. The analysed period is 2000 – 2010, with focus on the year 2000, 2005, 2008 and 2010. These years was chosen as they are important from the view of world affairs.

Calculations of the probability density function are made in software EasyFit where we have chosen the Gumbel Max distribution, which is two-parameter test, the first parameter is standard derivation: α and the second is mean of normal random variable X: μ. The mathematical expression of this probability density function is:

$$f(x) = \alpha^{-1} exp - \frac{(x-\mu)}{\alpha} \exp[-\exp - \frac{(x-\mu)}{\alpha}] \qquad (1)$$

where: $x \in R$, $\alpha > 0$ and $\mu \in R$ (Mahdi, S. and Cenac, M., 2004).

As test of Gumbel Max distribution is used Anderson-Darling test. This test is a one-sided test and the hypothesis H_0 that the statistical file has Gumbel Max distribution is rejected, if the test statistic is greater than the critical value (Markechova et al., 2011).

As a way of measuring the tightness of dependencies between time series, we use the method of the first-order differential, which leads to the exclusion of the trend component. First-order differential represent an altered residual component with which we are working. The Pearson coefficient of correlation is used to analyze the leakage rate between residual constituents of the series. The correlation coefficient between the two time series differentials are calculated as follows (Ivor et al., 2009):

$$r_{\Delta x_t \Delta y_t} = \frac{\frac{\sum \Delta x_t \Delta y_t}{n} - \frac{\sum \Delta x_t}{n} \cdot \frac{\sum \Delta y_t}{n}}{\sqrt{\left\{\frac{\sum \Delta^2 x_t}{n} - \left(\frac{\sum x_t}{n}\right)^2\right\}\left\{\frac{\sum \Delta^2 y_t}{n} - \left(\frac{\sum \Delta y_t}{n}\right)^2\right\}}} \qquad (2)$$

P-value for Pearson coefficient is calculated in Statistics calculators´ version 3.0 beta. The Pearson coefficient is tested by two-tailed test of significance.

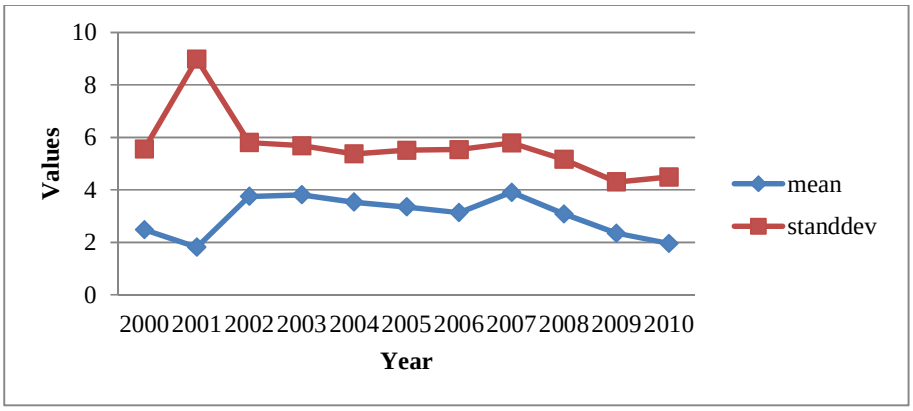
We analyse the inter-regional migration and how foreign immigrants influence the disparities between regions. In this connection we would like to note that migrants tend to migrate into the locations vacated by domestic emigrants. The acceptation of this hypothesis, which has been confirmed in Stehlíková-Stašáková paper (2007) by using the tools of spatial statistics, implies that foreign immigrants do not necessarily mean competition for domestic workers. We examine also correlation between migration and the real risk of poverty – i.e. the

proportion of people whose net income is below 60% of median disposable income in the country. This is a relative measure of poverty associated with the distribution of income, taking into account all sources of cash income (European Commission, 2010). We have to underline that it is not easy to define the poverty as it is to a certain extent subjective parameter. Poverty can be defined as a condition in which a person is deprived of the essentials for a minimum standard of well-being and life (Trinczek, 2007).

2. Results and discussion

Our calculations are presented in this part and according to these calculations we present also our results. From the figure 1 it is obvious that as the standard deviation is decreasing, the disparities between regions are minimizing. On the other hand the mean is also, except one cause, decreasing which means, that the number of migrants between years 2002-2010 decreased.

Fig. 1: The trend of the mean and standard deviation



Source: own processing of Eurostat data.

Tab. 1: Table of the 1st derivations and correlation coefficient for these 1st derivations

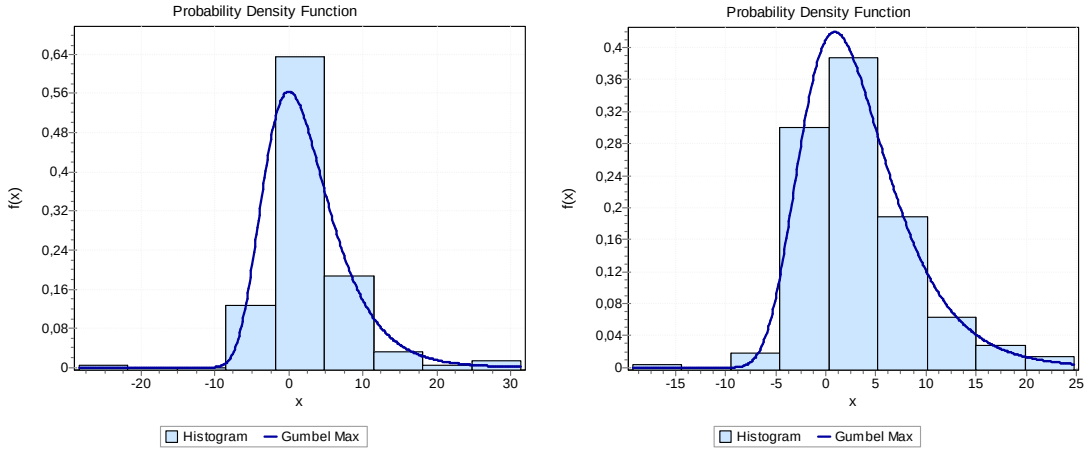
	First derivations										Correlation coefficienf of the first derivations	p-value
mean	-0.6745355	1.9394811	0.0546659	-0.2756098	-0.1787456	-0.2219512	0.7751062	-0.8253425	-0.730803	-0.3892292	-0.597459547	0.0681899
standdev	3.4212233	-3.1735596	-0.117581	-0.313358	0.1397112	0.022431	0.252289	-0.6258699	-0.8570908	0.1918541		

Source: own processing of Eurostat data.

Table 1 above, presents Pearson correlation coefficient for the 1st derivations from the mean and standard deviation. The significance of this correlation coefficient is tested by p-value. As p-value is higher, than chosen level of significance, in our case it is 0.05, we can consider the intensity of correlation is not statistically significant and therefore we cannot

disapprove the hypothesis H_0, that mean and standard deviation are independent variables and therefore we can hypothesis that there is no correlation between decreasing number of migrants and disparities between regions from the view of migration.

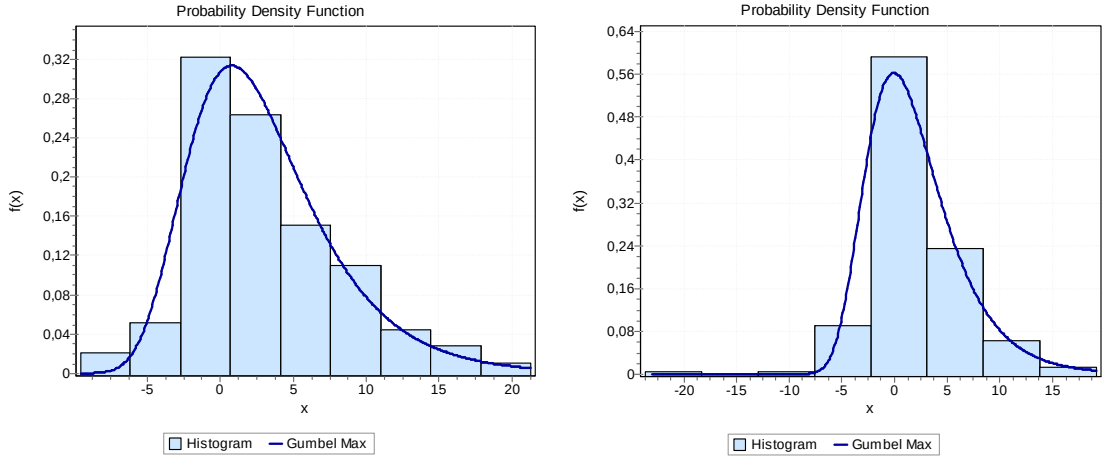
Fig. 2: Probability Density Function for Crude rate of net migration plus statistical adjustment for years 2000 and 2005



α=4,3322 μ=-0,0101 α=4,2982 μ=0,87477

Source: own processing of Eurostat data.

Fig. 3: Probability Density Function for Crude rate of net migration plus statistical adjustment for year 2008 and 2010



α=4,0244 μ=0,76061 α=3,5057 μ=-0,06003

Source: own processing of Eurostat data.

Figures 2 and 3 above, illustrate also very important findings because just when we know also the probability of distribution of the statistical file, which is in this cause CRN, we can state that we know the characteristic of the event. According to Anderson-Darling test of Gumbel Max distribution we can reject the hypothesis that statistical file has Gumbel Max

distribution in year 2000 and 2010 and we can accept it in year 2005 and 2008. The table 2 which contains values of test statistic and critical value with significance level 0.05 for each examined year is listed below.

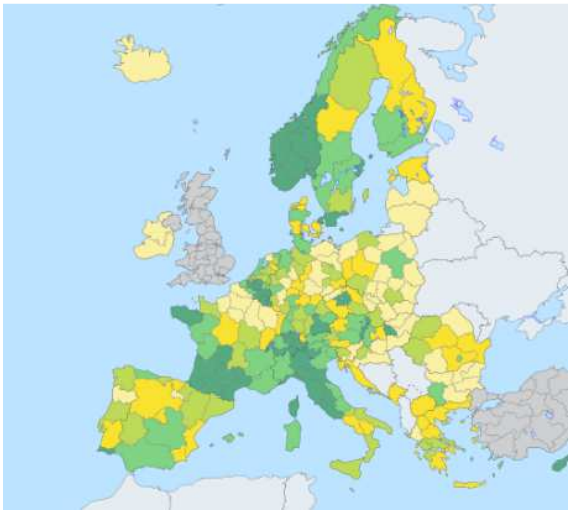
Tab. 2: Test statistic and critical value of Anderson-Darling test

Values/year	2000	2005	2008	2010
test statistic	5.9958	1.3566	0.9651	7.3275
critical value	2.5018	2.5018	2.5018	2.5018
α	0.05	0.05	0.05	0.05

Source: own processing.

Figure 4 below, illustrates CRN plus statistic adjustment in year 2010 at NUTS 2 level. According to legend we can state that there are 101 regions with the higher and high positive CRN, 52 regions with lower positive CRN, 49 regions with negative and 53 regions with extremely negative CRN.

Fig. 4: Crude rate of net migration plus statistic adjustment 2010 – NUTS 2 level



Legend:		Causes:
	-23.7- -0.6	53
	-0.6-0.4	49
	0.4-2.1	52
	2.1-5.4	52
	5.4-19.2	49

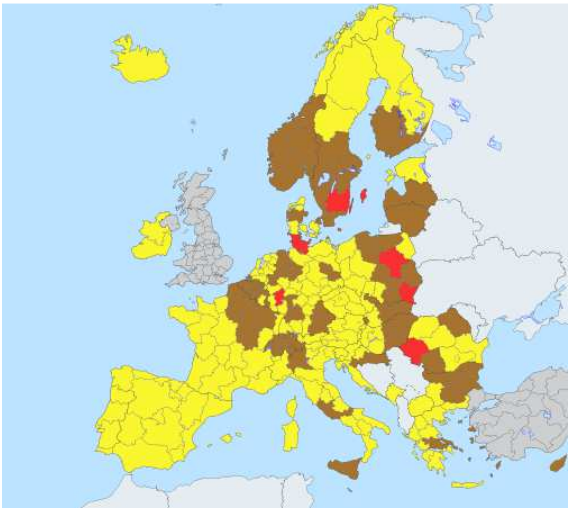
Source: Eurostat.

Regions from the first group are mainly in Norway, Sweden, Finland, Denmark, Germany, France, Spain, Portugal, Italy, Austria and Swiss, however, there are some regions as in Portugal (e.g. Centro, Alentejo), Spain (e.g. Comunidad de Madrid and C. de Valenciana,…), France (e.g. Centre, Champagne-Ardene, Picardie, …), Sweden (Melersta Norrland), Denmark (e.g. Midtjylland, Sjaelland,…), Finland (Pohjois-Soumi, Itä-Soumi), where CRN reach negative, or extreme negative values. Extreme negative values from -23,7 to -0,6 are typical for Lithuania (region Lietuva) and Latvia (region Letvija), Romania (all regions except Nord-Vest, Vest and Bucuresti-Ilfov), Poland (all regions belong to this group, except 6 regions from which 2 – Wielkopolskie and Lubuskie belong to regions with negative

CRN), Greece (all regions except Dytiki-Ellada, Sterea-Ellada and Attiki). Eastern and central region of Slovakia also belong to regions with extreme negative values of CRN. From Czech Republic belong here regions Střední Morava and Moravskoslezsko.

Figure 5 compares CRN in years 2010 and 2005. The CRN has stayed stable just in 6 regions, the red ones (e.g. regions in Sweden, Germany, Poland, or Romania). CRN has been increased in 91 regions with brown colour and CRN has been decreased in 158 regions, which are yellow. To the regions with increased CRN belong especially regions with extremely negative CRN. Such result is not very surprising as people tend to move from weak regions into the more wealthy regions as it is proved in table 3 below.

Fig. 5: Crude rate of net migration plus statistical adjustment - comparison of years 2005 and 2010



Legend:		Causes:
	-9.2234E14 - 0.9999	158
	1.0000	6
	1.0001- 9.2234E14	91

Source: Eurostat.

From the table 3 it is obvious that there is statistically significant correlation between CRN (plus statistic adjustment) and percentage of people at risk of poverty, which is quantified by Pearson correlation coefficient.

Tab. 3: Correlation coefficient for crude rate of net migration plus statistical adjustment (per 1000 inhabitants) and people at risk of poverty (in percentage of population)

Value/Year	2000	2005	2008	2010
Correlation coefficient	-0.41136977	-0.500502159	-0.539256262	-0.409711692
p-value	0.00332556	0.00000044	0.000000000	0.00000157

Source: own processing of Eurostat data.

The significance of this correlation coefficient is tested by p-value. As p-value is smallest, than chosen level of significance, in our case it is 0.05, we can consider the intensity of correlation as statistically significant and therefore we can disapprove the hypothesis H_0 that examined variables are independent. This fact allows us to hypothesize that people tend to migrate from regions with higher percentage of people at risk of poverty into the regions with lower percentage of people at risk of poverty.

Conclusion

Migration is very important studying field as at the country, so at the regional level. One big question in the case of migration is the real impact of migrants on the destination country as there are opinions that migration could have negative impact on the labour market in the destination country or region. In has been confirmed that foreign immigrants do not necessarily mean competition for domestic workers as they tend to migrate into the locations vacated by domestic emigrants.

As the standard deviation and also mean has decreased the disparities between regions have minimized and the number of migrants between years 2002-2010 have decreased. From the test of significance of Pearson correlation coefficient it is clear that the mean and standard deviation are independent variables and therefore we can hypothesise that there is no correlation between decreasing number of migrants and disparities between regions from the view of migration.

The analysis of CRN has shown that there are 101 regions with the higher and high positive CRN, 52 regions with lower positive CRN, 49 regions with negative and 53 regions with extremely negative CRN. Extreme negative values of CRN are typical for regions in Latvia, Lithuania, Romania, Poland, Greece, but also for some Slovak and Czech regions. The comparison of CRN between years 2005 and 2010 has shown that to the regions with increased CRN belong especially regions with extremely negative CRN. This result is not very surprising as people tend to move from weak regions into the more wealthy regions as there is statistically significant correlation between CRN and percentage of people at risk of poverty.

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