

# INTERNATIONAL MIGRATION AND UNEMPLOYMENT IN ESTABLISHED MEMBER COUNTRIES OF THE EUROPEAN UNION

Milan Palát

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## Abstract

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The objective of the paper is to evaluate relationships of the rate of migration and the unemployment rate in established member countries of the European Union covering also the period of the last financial and economic crisis and using statistical methods. To determine parameters of a regression function were used methods of regression and correlation analysis including testing the statistical significance. Nearly all countries (except Luxemburg and Austria) show a negative linear relationship between tested indicators however not always statistically significant. Based on these results, the existence of correlation is evident between the crude rate of net migration and the unemployment rate in more than a half of the monitored countries. Calculated correlation indices show highly statistically significant results for typically immigrant's destination countries, e.g. Germany, United Kingdom, Luxembourg, and Belgium but we can find statistically significant results also in countries which are facing enormous economic problems during the last financial and economic crisis, esp. in Ireland, Spain and Italy. With an exemption of Belgium, the selected type of regression function doesn't play a role as it regards the statistical significance of correlation indices and the use of polynomials of higher degrees doesn't improve those results significantly. The analysis of the crude rate of net migration and the unemployment rate presented in this paper can be further used and developed when other variables would be added to the model.

crude rate of net migration, established member countries, unemployment, correlation

The consequences of international migration on both social and economic life in receiving and sending countries should not be underestimated. In view of the significance of international migration in European population dynamics, it is highly relevant to study the factors that determine international migration in the periods of economic boom and also in the times of economic crises. Economic determinants of international migration are mostly associated with labour migration. However, other migration types are also partly determined by economic factors. The dominant international migration type in Europe in the 1960s and the early 1970s (until the economic recession of 1973–1974) was labour migration. Many South European workers migrated to Western Europe (King, 1993; King and Rybczuk, 1993). Since the

1980s, economic factors seem to play a bit less important role in explaining migration flows within Europe. For instance, the consequences of opening international borders within the European Union for intra-European labour migration appeared to be small. At the same time, economic indicators remain important factors behind intercontinental migration flows to Europe and behind migration from the former communist countries in Eastern Europe to the European Union and EFTA countries (European Free Trade Association). Jurčík (2007) argues that EU public procurement has a significant influence on the business environment. The theoretical rationales for the different international migration types are quite complex as the factors which influence migration often also largely influence each other. For instance, the socio-

economic situation in a receiving country is often a very important determinant of the migration policy of this particular country. The collapse of the communist bloc in Central and Eastern Europe had also significant impacts on migration flows. From 1989 onwards, a period of transition started. As a consequence of the downfall of the communist system, several countries, which did not exist in the previous period, were formed (Russia, the Ukraine, Belarus, Moldova, Estonia, Latvia, Lithuania, Croatia, Bosnia-Herzegovina, Serbia-Montenegro, Macedonia, Slovenia, Czech Republic, Slovakia and (a united) Germany, and others (the Soviet Union, Yugoslavia, Czechoslovakia and East and West Germany) had ceased to exist and international migration to Western Europe was highly influenced by these historical developments. New mobility trends were dealt for instance by Abramuszkínová Pavlíková (2011) but although the geographical pattern of migration in Europe has changed, much of the theoretical rationale for migration remains nevertheless relatively unchanged.

## OBJECTIVE AND METHODS

This paper is focused on the development and relationships of migration and unemployment. The objective of the paper is to evaluate relationships of the crude rate of migration and the unemployment rate in established member countries of the European Union covering also the period of the last financial and economic crisis and using statistical methods including testing the statistical significance. A starting point of the paper is the study of domestic and foreign specialized literature. Bauer, Zimmermann (1999) assessed possible migration pressure and its labour market impacts already in the 1990's. Economic consequences of international migration of labour were dealt for example by Fevre (1998), Boeri and Brücker (2000, 2005, 2008), Fertig (2001), Straubhaar (2002) or Breitenfellner *et al.* (2008). The data for following analysis come from the source of Statistical Office of the European Union (EUROSTAT). I focussed on established member countries of the European Union. In this analysis, following countries are included: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom. The reference period has been set for the period 1990–2010. If there weren't data available at the beginning of the reference period for some countries, the time series of these countries were shortened accordingly. Thus, for Germany, the reference period is 1992–2010. For Austria, the reference period is 1994–2010. And for France and Greece, the reference period is 1998–2010. After obtaining information on the character of data a decision followed concerning the use of methods suitable for the evaluation of relationships between the crude rate of net migration and the unemployment rate. Statistical methods have been

used for the evaluation of data represented by the EUROSTAT.

The hypotheses describe the effects of unemployment for net migration in the selected reference sample: There is a statistically significant relationship between the development of unemployment and the crude rate of net migration. Higher unemployment rates result in lower migration rates. Thus, in the relationship between unemployment and net migration a negative sign can be expected. The evaluation of relationships between the crude rate of net migration and the unemployment rate in the selected group of countries, which is the objective of this paper, can be carried out using methods of regression and correlation analysis including testing the statistical significance. A model presented by Palát (2010) can be used for needs of this paper. Moreover, it can be completed by means of other variables on the basis of knowledge obtained from the study of literature.

The data for an indicator of the crude rate of net migration plus adjustment comes from the source of EUROSTAT (2011) and 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. The net migration is the difference between the total change and the natural change of the population. The values of the indicator of unemployment rate result also from the data of EUROSTAT. The use of statistical methods was described by Aczel (1989) or Mason, Lind (1990). The factual data processing comes from the methodology published by Hindls *et al.* (2003), Dirschedl, Osteermann (2001) and Palát (2010). The statistical dependence of two characteristics (numeric figures) can be expressed as their functional relation by a formula, table or graph. We recognize these types of statistical dependence: fix, functional alias deterministic dependence and free, statistic alias stochastic dependence. The stochastic dependence makes itself felt like more or less significant repeatable tendency, which realizes in different form on different place and in different time. It is characteristic for its variability of individual causes and makes itself felt under a row of noteless, variously reacting factors. The stochastic dependence is referred to as a correlation dependency. For this dependency, we distinguish from dependent and independent variable. The correlation analysis of two variables is called pair or simple analysis.

The main graphical data presentation tool for examining the dependence between two variables is a point diagram, where we mark particular cases as points in a reference frame with coordinates, which are the values of particular dependent and independent variables.

The equation for a linear model is:

$$y' = b_0 + b_1x$$

The equation for a quadratic model is:

$$y' = b_0 + b_1x + b_2x^2$$

The equation for a cubic model is:

$$y' = b_0 + b_1x + b_2x^2 + b_3x^3.$$

The equations for a bisector or second-degree parabola are the same as trend determination in temporal series. In this paper, particular characteristics of tightness of the dependency of variables are calculated. Conjugate regression lines show the same values of the tightness dependency characteristics, the correlation coefficient  $r_{yx} = r_{xy}$ , determination coefficient  $r_{yx}^2 = r_{xy}^2$  (at the first place in this index is stated variable thought to be dependent). The correlation index  $I_{yx}$  is a dependency tightness characteristics for any type of regression function (for simple as well as multiple dependencies of variables). Its second power is determination index  $I_{yx}^2$ . Determination index multiplied by 100 presents the explanation percentage of the calculated regression function – how the changes of dependent variable  $Y$  are explained by the changes of independent variable(s). Statistical software Unistat 5.11 for Windows has been used for the calculation of following results.

## RESULTS AND DISCUSSION

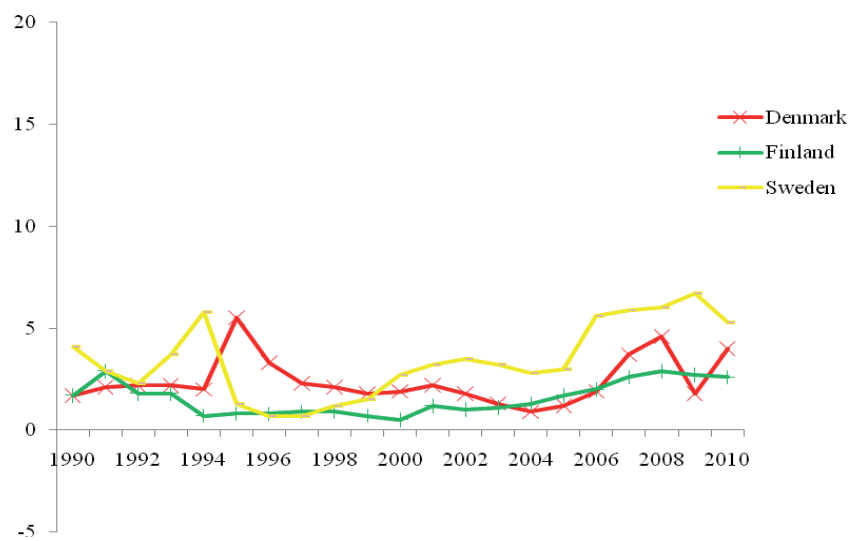
International labour migration is mainly promoted by economic interests (higher obtained real wage, higher standard of living). Migration inflows may satisfy needs for both low and high level workers on labour markets of receiving countries. A part of the migration inflows helps to satisfy the need for low level workers in agricultural, gastronomic or building sectors as domestic workers are not interested in some of those professions. Native workers attain than higher positions, since lower positions are taken over by immigrants. It may partly improve the unemployment situation in emigration countries but on the other hand they may start to suffer from a shortage of manpower and the immigration of third state nationals may be needed to satisfy their domestic needs. Even countries as for instance Greece started to seek workers for particular sectors of the national economy that were no longer attractive for native workers due to the poor wage compared to the other EU15 member states. This way the prosperity gap should be shifting bit by bit from the centre to the periphery.

And then there is another part of migration flows that satisfies the need for highly trained workers in the destination country. While the receiving country can profit from the qualified labour force from abroad without bearing any of the costs of educational system and vocational training, the countries where the workers come from suffer from lack of highly qualified labour force which is often described as a “brain drain” even if some authors

don't agree with the this nature of expression and ceased to use it. Many highly developed countries that support a smooth immigration of high qualified workers, have at the same time a legislation that creates barriers for immigration of low qualified workers and as a result of this uneven situation the difference gap in the human capital level between advanced and developing countries is widening ever more. The last two decades brought significant changes, which affected further economic development of analyzed countries. First, it is possible to meet the development of an indicator of the crude rate of net migration plus adjustment in the reference period 1990–2010 which 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. The net migration is the difference between the total change and the natural change of the population.

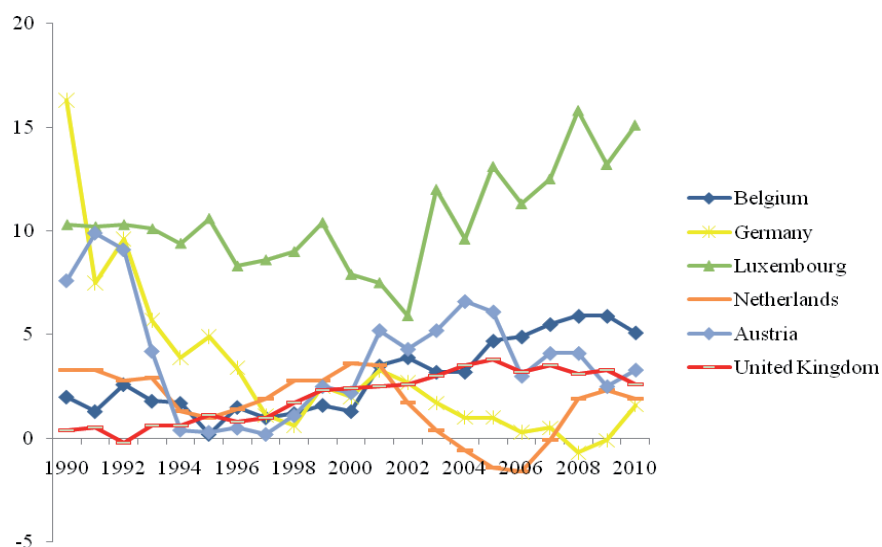
The Development of the crude rate of net migration in the selected sample of countries during the reference period 1990–2010 is evident from Fig. 1–3. While in Scandinavian countries the crude rate of net migration is relatively stable and well below 5 per cent, see Fig. 1, the rest of the EU15 is experiencing other developments. The less fluctuating developments can be found in the United Kingdom, Netherlands or Austria. In the most of other countries the crude rate of net migration fluctuates significantly. However there seems to be a stabilising point from around mid 90's in those countries, see Tab. II, with an exemption of Luxembourg. This country is a very specific small opened economy and has been achieving permanently high values of this indicator that stem from the size of the economy, its geographical location at proximity of three neighbouring countries and its specific structure of national economy. A very different development can be observed in those countries of the EU15 that have been struggling the most during the last economic, financial and debt crisis. The crude rate of net migration achieved its peak at the start of the last crisis and then fell down sharply as can be seen for instance in Spain or Ireland. However in some countries a durable decline can be observed resulting from poor economic achievements in the last decade (Greece, Portugal).

While the average value for the EU15 fluctuated in the interval of 0 to +2 per cent during the reference period, it is obvious that there are significant differences in particular countries as it was documented in Fig.1–3. According to the data one of the highest positive values of the crude rate of net migration were observed in 2006 and 2007 in Ireland and Spain, the lowest values were found in Ireland and Portugal in 2010. So Ireland experienced both an immense immigration growth in the crude rate of net migration from the mid 90's and a deepest decline in the development of the same indicator between 2007–2008 and 2008–2009, respectively.



1: The development of the crude rate of net migration in Denmark, Finland and Sweden in the period 1990–2010

Source: own processing



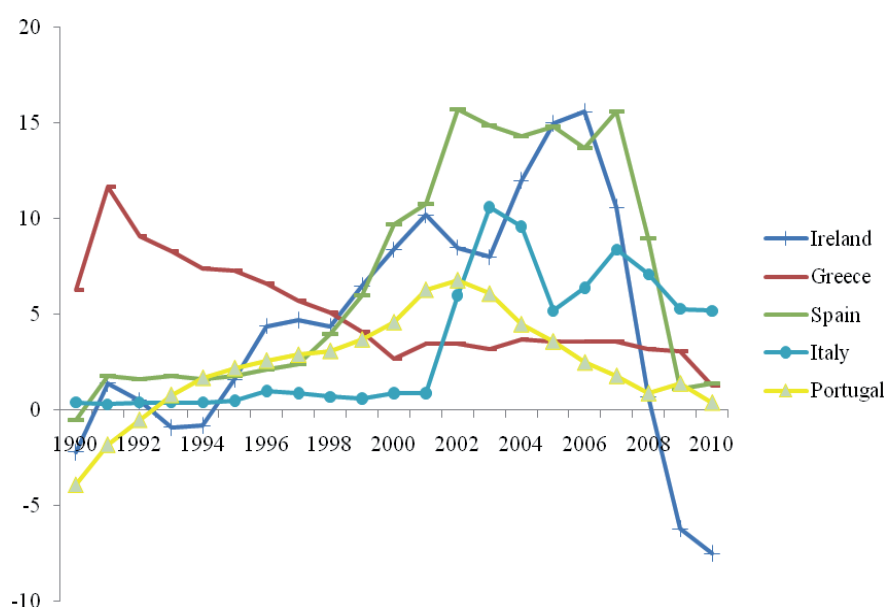
2: The development of the crude rate of net migration in Belgium, Germany, Luxembourg, Netherlands, Austria and United Kingdom in the period 1990–2010

Source: own processing

For the purpose of a more profound analysis, data available from EUROSTAT in monitored countries are repeatedly used. The reference period has been set for the period 1990–2010. If there weren't data available at the beginning of the reference period for some countries, the time series of these countries were shortened accordingly. Thus, for Germany, the reference period is 1992–2010. For Austria, the reference period is 1994–2010 and for France and Greece, the reference period is 1998–2010. I shall try to prove statistically the existence of correlation between the crude rate of net migration and the unemployment rate in all analyzed countries. Perhaps even other variables can be added to the model and some authors include into the analysis

also a variable gross domestic product per capita. To determine parameters of a regression function were used methods of regression and correlation analysis (including testing the statistical significance) described in the part Methods. Parameters of linear, quadratic and cubic regression functions in the given reference period are presented in Tab. I and Tab. II.

Nearly all countries (except Luxemburg and Austria) show a negative linear relationship between tested indicators however not always statistically significant. Based on these results, the existence of correlation is evident between the crude rate of net migration and the unemployment rate in more than a half of the monitored countries. Indices of



3: The development of the crude rate of net migration in Ireland, Greece, Spain, Italy and Portugal in the period 1990–2010

Source: own processing

I: Parameters of a regression function for the crude rate of net migration with respect to the unemployment rate in the EU15 countries in the reference period

Country	Model	Model parameters				$I_{yx}$
		$b_0$	$b_1$	$b_2$	$b_3$	
Austria	1	-3.1388	1.4418	-	-	0.3260
	2	64.6312	-30.2260	3.6579	-	0.5136
	3	125.5950	-72.6623	13.4259	-0.7436	0.5147
Belgium	1	7.4214	-0.5527	-	-	0.3274
	2	-59.8479	16.3689	-1.0466	-	0.6853 <sup>++</sup>
	3	-385.635	139.0707	-16.2870	0.6245	0.7423 <sup>++</sup>
Denmark	1	2.4709	-0.0113	-	-	0.0166
	2	4.8511	-0.8279	0.0648	-	0.1664
	3	28.5193	-13.1309	2.0850	-0.1051	0.5374
Finland	1	2.8236	-0.1268	-	-	0.5546 <sup>++</sup>
	2	3.6253	-0.2939	0.0078	-	0.5718 <sup>++</sup>
	3	-1.0351	1.5191	-0.1978	0.0069	0.7218 <sup>++</sup>
France	1	5.7698	-0.3989	-	-	0.3247
	2	-48.3365	11.2101	-0.6175	-	0.6235
	3	-166.890	49.6488	-4.7433	0.1466	0.6316
Germany	1	11.4846	-1.0778	-	-	0.5251 <sup>+</sup>
	2	45.0391	-8.8898	0.4462	-	0.6192 <sup>+</sup>
	3	188.2887	-59.7113	6.3605	-0.2257	0.6669 <sup>+</sup>
Greece	1	4.8094	-0.1387	-	-	0.2261
	2	-13.5543	3.5510	-0.1821	-	0.5247
	3	112.3211	-34.6629	3.6283	-0.1249	0.6574

Note: Correlation index:  $I_{yx}$  Significance level: +  $\alpha = 0.05$ ; ++  $\alpha = 0.01$

Source: own calculations

II: Parameters of a regression function for the crude rate of net migration with respect to the unemployment rate in the EU15 countries in the reference period

Country	Model	Model parameters				$I_{yx}$
		$b_0$	$b_1$	$b_2$	$b_3$	
Ireland	1	14.8894	-1.1615	-	-	0.8179 <sup>++</sup>
	2	24.4850	-3.7750	0.1388	-	0.8501 <sup>++</sup>
	3	25.9103	-4.3201	0.1992	0.1992	0.8501 <sup>++</sup>
Italy	1	17.9227	-1.6045	-	-	0.7345 <sup>++</sup>
	2	30.5934	-4.5003	0.1604	-	0.7431 <sup>++</sup>
	3	-151.872	60.8163	-7.4578	0.2897	0.7805 <sup>++</sup>
Luxem-bourg	1	5.9032	1.4242	-	-	0.6802 <sup>++</sup>
	2	10.6662	-1.7222	0.4603	-	0.7059 <sup>++</sup>
	3	33.5865	-25.8306	8.3378	-0.8013	0.7730 <sup>++</sup>
Nether-lands	1	3.1720	-0.3286	-	-	0.2540
	2	6.4620	-1.8228	0.1588	-	0.3034
	3	20.5826	-11.5708	2.2832	-0.1470	0.3583
Portugal	1	2.4665	-0.0146	-	-	0.0119
	2	-6.9652	2.7159	-0.1807	-	0.3645
	3	-30.9474	13.0754	-1.5746	0.0587	0.4290
Spain	1	24.7942	-1.3066	-	-	0.8357 <sup>++</sup>
	2	54.6132	-5.8153	0.1585	-	0.8871 <sup>++</sup>
	3	15.7806	3.2535	-0.5188	0.0162	0.8930 <sup>++</sup>
Sweden	1	4.3354	-0.1286	-	-	0.1437
	2	2.4598	0.5657	-0.0562	-	0.2237
	3	9.2523	-4.3215	0.8768	-0.0524	0.3622
United Kingdom	1	5.8245	-0.5647	-	-	0.7987 <sup>++</sup>
	2	8.0173	-1.2112	0.0447	-	0.8037 <sup>++</sup>
	3	22.5032	-7.4866	0.9191	-0.0393	0.8113 <sup>++</sup>

Note: Correlation index:  $I_{yx}$  Significance level: +  $\alpha = 0.05$ ; ++  $\alpha = 0.01$

Source: own calculations

correlation were calculated for particular countries and types of a regression function. Calculated correlation indices show highly statistically significant results for typically immigrant destination countries, e.g. Germany, United Kingdom, Luxembourg, and Belgium but we can find statistically significant results also in countries which are facing enormous economic problems during the last financial and economic crisis, esp. in Ireland, Spain and Italy. With an exemption of Belgium, the selected type of regression function doesn't play a role as it regards the statistical significance of correlation indices and the use of polynomials of higher degrees doesn't improve those results significantly.

## CONCLUSIONS

The last two decades brought significant changes, which affected further economic development of Western European countries. International labour migration is mainly promoted by economic interests. Therefore this paper is focussed on one particular relationship, the development and relationships of migration and unemployment. The objective

of the paper was to evaluate relationships of the crude rate of migration and the unemployment rate in established member countries of the European Union covering also the period of the last financial and economic crisis and using statistical methods including testing the statistical significance.

As first, it is possible to get acquainted with the development of an indicator of the crude rate of net migration plus adjustment in the reference period 1990–2010. Based on values of this indicator, it is evident that while in Scandinavian countries the crude rate of net migration is relatively stable and well below 5 per cent, the rest of the EU15 is experiencing other developments. The less fluctuating developments can be found in the United Kingdom, Netherlands or Austria. In the most of other countries the crude rate of net migration fluctuates significantly. However there seems to be a stabilising point from around mid 90's in those countries with an exemption of Luxembourg which has a very specific economic structure. A very different development can be observed in those countries of the EU15 that have been struggling the most during the last economic, financial and debt crisis. The crude rate of net migration

achieved its peak at the start of the last crisis and then fell down sharply as can be seen for instance in Spain or Ireland. However in some countries a durable decline can be observed resulting from poor economic achievements in the last decade (Greece, Portugal). While the average value for the EU15 fluctuated in the interval of 0 to +2 per cent during the reference period, it is obvious that there are significant differences in particular countries where some experienced periods of both strong growth and then deep decline in the crude rate of net migration. For instance, Ireland experienced an immense immigration growth from the mid 90's and a deepest decline in the development of the same indicator between 2007–2008 and 2008–2009, respectively.

In the following step, I tried to prove statistically the existence of correlation between the crude rate of net migration and the unemployment rate in all analyzed countries. To determine parameters of a regression function were used methods of regression and correlation analysis including testing the statistical significance. Nearly all countries (except Luxemburg and Austria) show an expected negative linear relationship between

tested indicators however not always statistically significant. Based on these results, the existence of correlation is evident between the crude rate of net migration and the unemployment rate in more than a half of the monitored countries. Indices of correlation were calculated for particular countries and types of a regression function. Calculated correlation indices show highly statistically significant results for typically immigrant's destination countries, e.g. Germany, United Kingdom, Luxembourg, and Belgium but we can find statistically significant results also in countries which are facing enormous economic problems during the last financial and economic crisis, esp. in Ireland, Spain and Italy. With an exemption of Belgium, the selected type of regression function doesn't play a role as it regards the statistical significance of correlation indices and the use of polynomials of higher degrees doesn't improve those results significantly. The analysis of the crude rate of net migration and the unemployment rate presented in this paper can be further used and developed when other economic and social variables would be added to the model.

## SUMMARY

The consequences of international migration on both social and economic life in receiving and sending countries should not be underestimated. In view of the significance of international migration in European population dynamics, it is highly relevant to study the factors that determine international migration in the periods of economic boom and also in the times of economic crises. The objective of the paper was to evaluate relationships of the rate of migration and the unemployment rate in established member countries of the European Union covering also the period of the last financial and economic crisis and using statistical methods. While the average value of the crude rate of net migration for the EU15 fluctuated in the interval of 0 to +2 per cent, it is obvious that there are significant differences in particular countries where some experienced periods of both strong growth and then deep decline in the crude rate of net migration. For instance, Ireland experienced an immense immigration growth from the mid 90's and a deepest decline in the development of the same indicator between 2007–2008 and 2008–2009, respectively. To determine parameters of a regression function were used methods of regression and correlation analysis including testing the statistical significance. Nearly all countries (except Luxemburg and Austria) show an expected negative linear relationship between tested indicators however not always statistically significant. Based on these results, the existence of correlation is evident between the crude rate of net migration and the unemployment rate in more than a half of the monitored countries. Indices of correlation were calculated for particular countries and types of a regression function. Calculated correlation indices show highly statistically significant results for typically immigrant's destination countries, e.g. Germany, United Kingdom, Luxembourg, and Belgium but we can find statistically significant results also in countries which are facing enormous economic problems during the last financial and economic crisis, esp. in Ireland, Spain and Italy. With an exemption of Belgium, the selected type of regression function doesn't play a role as it regards the statistical significance of correlation indices and the use of polynomials of higher degrees doesn't improve those results significantly. The analysis of the crude rate of net migration and the unemployment rate presented in this paper can be further used and developed when other economic and social variables would be added to the model.

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## Address

Ing. Milan Palát, Ph.D., Department of Territorial Studies, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: mpalat@mendelu.cz