Spatial Typology of the Population Growth in European Union after 1990

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Abstract. The article is deal with the demographic changes differences between European Union countries. We are research their population size changes during last 20 years. The spatial typology is given weigh of the three indicators: crude natural increase rate, crude net migration rate and crude total population increase rate. The analyses on this spatial level are working with the creation of cartogram method for processing of the demographical data. We can use ArcGIS 9.3 and his version ArcMap 9.3 as a complete system for authoring, serving, and using geographic informations for better processing the spatial data by the help of cartogram method. Our principal main is to group the all 27 EU countries on the basis population growing, population stagnant or population decreasing. Therefore we are using the basic measurement methods of the population numbers change (crude natural increase rate, crude net migration rate, crude total population increase rate). The world's current (overall as well as natural) growth rate is about 1.14%. The maximum of the total population growth on the EU territory was achieved during the period 2002 to 2008 (around value 4.4. ‰). The mean of the crude total population increase rate in the whole period 1990 to 2009 was 3 ‰ in the European Union. Sixteen countries from northern, western a southern Europe grew together more than the whole EU. Only eleven countries from central and south-eastern Europe had none population growth or visible loosed population size.

Keywords: European Union countries, natural increase, net migration, population change, population size, total population increase, crude natural increase rate, crude net migration rate, crude total population increase rate.

1 Introduction

It is very useful to anywhere when the population is unnoticed part of the science focus. Human resources are one of four the basic economic resources next to capital, soil and new technology. Economic behaviour is always affected by living phase. The population is playing the important rule in all basic economic activities as consumption, production and change. And characters of these activities have a strong contexture on the population size and development.

The main aim of this study is to compare differences of the population growth between 27 member countries of the European Union. We will analyses change of their population size after year 1990. This is a very long period of last twenty years. We are using detailed statistics on the European Union which is prepared by their statistical office situated in Luxembourg. Its task is to provide the European Union with statistics at European level that enable comparisons between countries and regions. Eurostat was established in 1953 to meet the requirements of the Coal and Steel Community. Over the years its task has broadened and when the European Community was founded in 1957 it became a Directorate-General (DG) of the European Commission.

Total population change depends on the size of natural increase and migration. Population growth is primarily caused by natural increase, that is, the excess of births over deaths. But in any particular region, migration will cause population growth when the amount of immigration exceeds the amount of emigration. And in the European Union at present, migration is a greater cause of population growth than natural increase. Both population growth and migration can affect the quality of the natural environment, the likelihood of conflict, and social cohesion between ethnic groups. In our view, the significance of both population growth and migration are often underestimated by governments and non-

Map 1. Member states of the European Union
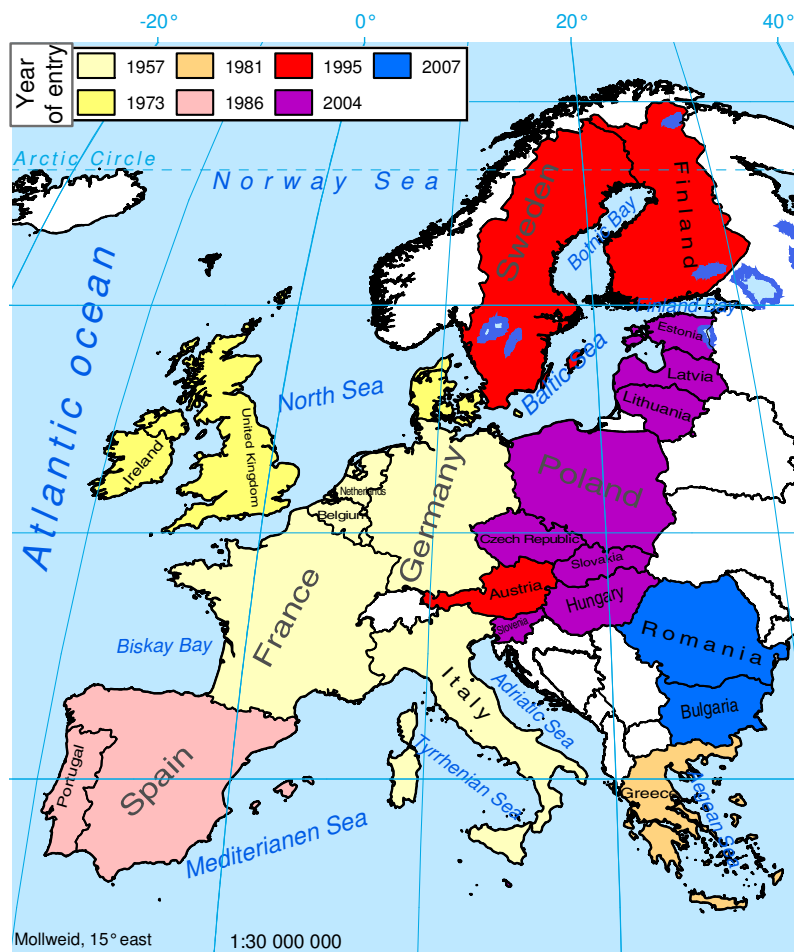
Source: Author

governmental organisations. The global human population is projected to grow from 6.9 billion in 2010 to 9.15 billion in 2050. The population of what is now the European Union increased from 403.4 million in 1960 to nearly 497.5 million in 2010. It is projected to go on increasing, reaching 521 million in 2035 and then begins to slowly decline to 506 million in 2060. Since 1992 net immigration has contributed more to total population growth than natural increase. The biggest differences between them were during the years 2002 and 2003. Now the migration is twice more than natural increase in the European Union. Net immigration is projected to continue to be the main cause of population growth.

The European Union was formally established when the Maastricht Treaty came into force on 1 November 1993. The European Union (EU) is an economic and political union of 27 member states (map 1). The EU has developed a single market through a standardised system of laws which apply in all member states including the abolition of passport controls within the Schengen area. Today the EU generated an estimated 28% of the global economy (against global nominal GDP), or 21 % when adjusted in terms of purchasing power parity (global GDP). In 2002, euro notes and coins replaced national currencies in 12 of the member states (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain). Since then, the **eurozone** (officially the **euro area**) has increased to encompass seventeen countries: Slovenia (2007), Cyprus (2008), Malta (2008), Slovakia (2009) and Estonia (2011).

Table 1. Basic characteristics of the EU

E U (year)	member states	area (sq km)	population (mil.)	density (inh./sq km)
1957	6	1,284,482	228.461	178
1973	9	1,640,749	297.708	181
1981	10	1,772,706	308.828	174
1986	12	2,370,680	362.387	153
1995	15	3,242,647	384.866	119
2004	25	3,991,651	459.387	115
2007	27	4,326,987	488.824	113
2010	27	4,326,987	497.533	115

Source: Author, based on UNO and Eurostat data

We can see, that process of spreading the European Union was very dynamic for the last more than fifty years (table 1). There lives nearly 73 % of the European population now. And the area of that region represents 42 % of European continental territory. Fifteen countries have less than ten million people and four countries have more than fifty million people (Germany, France, United Kingdom

and Italy). Malta it's only 0.5 % of the Germany population and less than 0.1 % of the French metropolitan area.

2 Analytic approaches and methodology of the sociodemographic process

Processes of the natality and mortality belong to basic declarations of the vital. Quality their mutual conditionality in terms of reproduction activity is express by indicator natural increase (*NI*). Natural increase is rise in population caused by birth rate (*B*) exceeding death rate (*D*) and excludes any population change due to migration. Crude natural increase rate (*CNIR*) is the number of persons added to a population due to natality and mortality over a given time period (e.g., 1, 5 or more years) and divided by the total mid-year population (*P*) and multiplied by 1,000 (equation 1):

$$CNIR = \frac{NI}{P} \ 1{,}000 \ [\text{‰}] \text{ or rather } CNIR = \frac{B - D}{P} \ 1{,}000 \qquad \text{equation 1}$$

Population change in an area is determined partly by the level of natural increase (*NI*) and partly by the level of net migration (*NM*), the difference between the numbers moving in (immigrant, *I*) and moving out (emigrant, *E*). Crude net migration rate (*CNMR*) is simply the net migration in a year divided by the total population at mid-year and multiplied by 1,000 (equation 2). That is:

$$CNMR = \frac{NM}{P} \ 1{,}000 \ [\text{‰}] \text{ or } CNMR = \frac{I - E}{P} \ 1{,}000 \ [\text{‰}] \qquad \text{equation 2}$$

The population change (total population increase, *TPI*, equation 3) over time we can quantified as the number aggregate of the natural increase (*NI*) and net migration (*NM*):

$$TPI = NI + NM \ , \qquad \text{equation 3}$$

In many cases is better to work with relative weight of this process. We can use indicator "crude total population increase rate" – *CTPIR* (equation 4).

$$CTPIR = \frac{NI + NM}{P} \ 1{,}000 \text{ or } CTPIR = CNIR + CNMR \qquad \text{equation 4}$$

3 Analysis of the natural increase

We have five groups as a result of the natural population change dynamic typology (map 2) for the last twenty years.

1st. The first group of the natural change aggregates regions Ireland and Cyprus with minimum values of *CNIR* 5 ‰. Actually Ireland has *CNIR* more than 10 ‰ (year 2009).

2nd. The group 2 (countries Malta, France, Luxembourg, Netherlands, Finland and United Kingdom has *CNIR* between 2.0 and 4.9 ‰.

3rd. The very numerous group is third. The countries Slovakia, Belgium, Denmark, Spain, Sweden, Poland, Portugal, Austria, Greece and Slovenia have positive *CNIR*, but less than 2 ‰. This is the most numerous group.

Map 2. Cartogram of *CNIR* in EU countries at the period 1990 – 2009
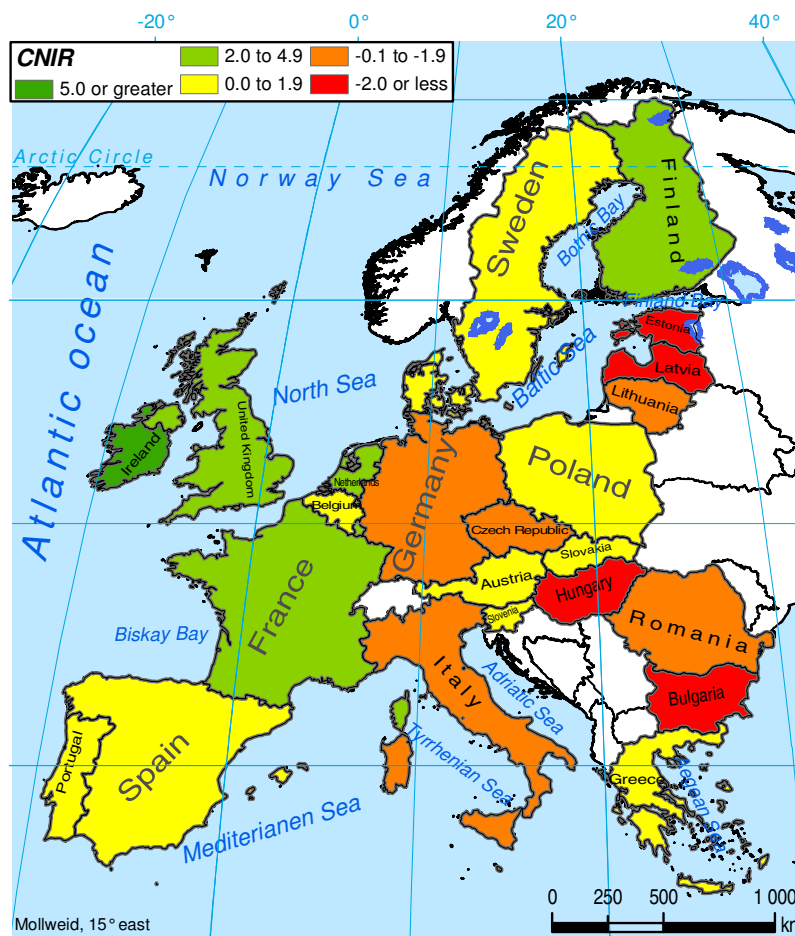
Source: Author

4th. There are fife countries at the fourth group: Italy, Czech Republic, Lithuania, Romania and Germany. We can speak about slow dying-cull of the people (*CNIR* is between 0 and 1.9 ‰)

5th. The best situation is on the countries Estonia, Hungary and especially Latvia and Bulgaria. Bulgaria lost nearly 13 % of the population during last twenty years.

It is true that from the beginning of the period under consideration was the *CNIR* value for the whole EU slightly decreasing. But between maximum (2.0 ‰) in the year 1990 and minimum (0.2 ‰) in the year 2003 was not very big difference. Average value of *CNIR* was 0.8 ‰ for the period 1990 to 2009. World average rate was 14.2 ‰ at the same time. Population growth in European Union was very poor and numbered value about 1per mille in the year 2010. The world value was 12 ‰ at the same year. We can forecast that approximately to the year 2020 or 2025 can be natural increase in the European Union positive. First of all United Kingdom, France, Netherland, Ireland and Finland have essential influence on European Union population growth today in dependence on natural increase. On the other hand almost the whole twenty years have population decreasing four countries: Bulgaria, Latvia, Hungary and Estonia (map 2).

4   Analysis of the migration behaviour

Average value of crude net migration rate was 2.2 ‰ at European Union for the last twenty years. Now is less than 2 ‰. Typology of migration is following (map 3):

1st. We have three groups with positive net migration for the last twenty years (twenty countries). The best situation is on these countries: Cyprus, Luxembourg, Spain, Greece and Ireland. Their net migration was more than 5.0 ‰.

2nd. The second group is most numerous with eight countries: Austria, Sweden, Italy, Germany, Belgium, Malta, Portugal and Denmark. Indicator crude net migration rate (*CNMR*) 2.0 and 4.9 ‰.

3rd. Seven countries (United Kingdom, Czech Republic, Netherlands, Hungary, Slovenia and France have for whole period a slow migration profits.

Map 3. Cartogram of *CNMR* in EU countries at the period 1990 – 2009
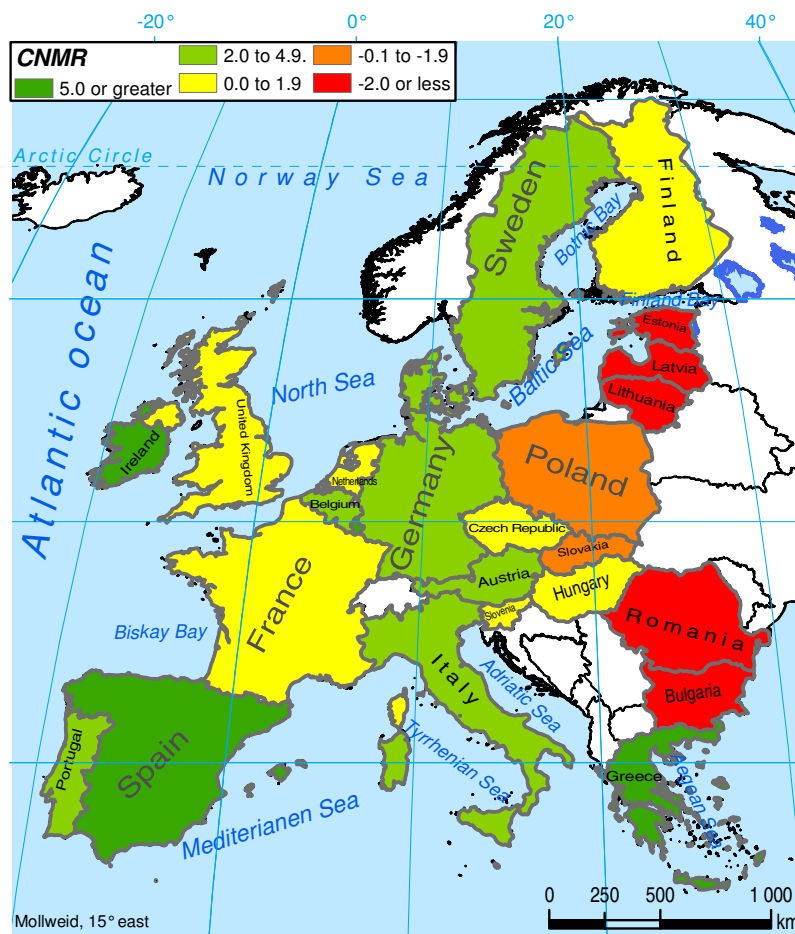
Source: Author

4th. Very imperceptible migration losses had Slovakia and Poland.

5th. Heavily non perspective situation was very typical for five EU members: Romania, Bulgaria, Lithuania, Latvia and Estonia. Their annual value of *CNMR* was -2.0 and more.

The greatest population growth owing to migration was at the time between years 2002 and 2007 in the EU. The value of *CNMR* runs over level three per mille.

The maximum was achieved in the year 2003 (4.2 ‰). We have six European Union countries which have significant population growth cause of net migration in the last time. These countries (Luxembourg, Greece, Sweden, Italy, Belgium, Spain and Denmark) have *CNMR* three and more per mille.

5   Conclusion

If we analyse the total population change by means of the crude total population increase rate (*CTPIR*) in a longer-term perspective of the last 20 years, we can distinguish four groups. Almost two-thirds of European Union members must be form migration policy, especially immigration policy. They are affected by the flow of international migration and therefore the European Commission has made proposals for developing this policy, most of which have now become EU legislation. The main objective is to better manage migration flows by a coordinated approach which takes into account the economic and demographic situation of the EU. Not only economic migration is consequential problem but demographic situation too.

1st. The *first group* of the population size change is the area of the eight countries: Cyprus, Luxembourg, Ireland, Spain, Malta, Greece, Netherlands and France. Their population growth was more than 5.0 ‰ by year. Only Malta, Netherlands and France were countries with more weight of the natural increase. This mean, that more of the eight EU members grew due to net migration.

2nd. The *second group* were countries with more remarkable growth between 2.0 and 5.0 ‰ as Austria, Sweden, Belgium, United Kingdom, Denmark, Finland, Italy and Portugal.

Map 4. Cartogram of *CTPIR* in EU countries at the period 1990 – 2009
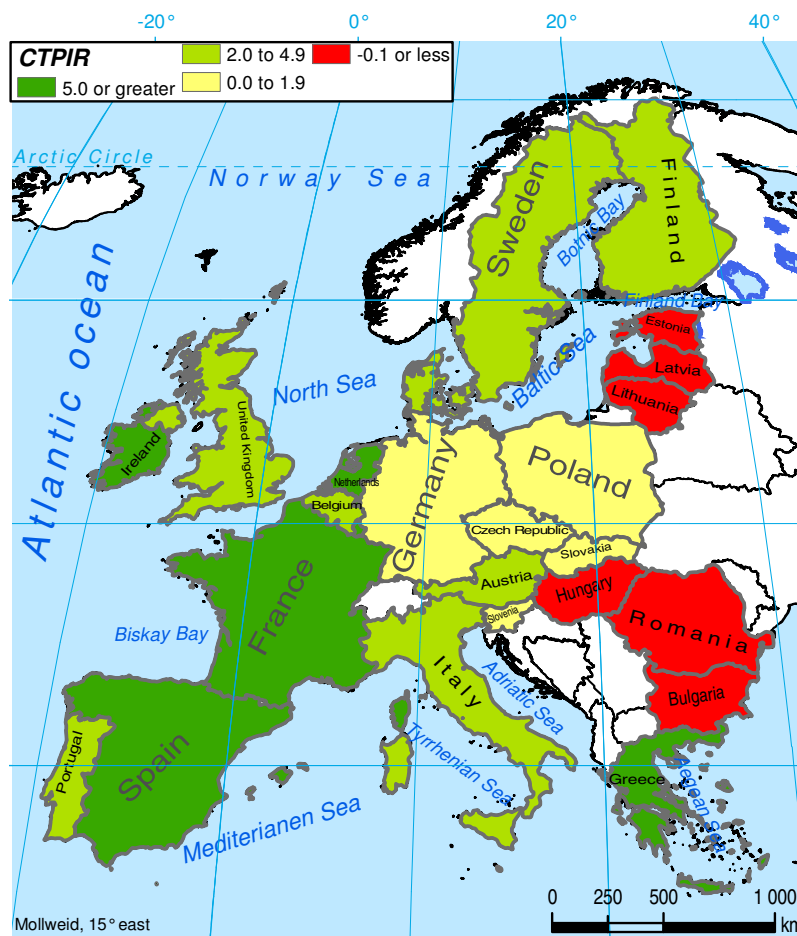
Source: Author

3rd. Only nerveless growth had countries: Germany, Slovenia, Slovakia, Czech Republic and Poland.

4th. As a critical region we can indicate territory these countries: Hungary, Romania, Lithuania, Bulgaria, Estonia and Latvia.

The maximum of the total population growth on the EU territory was achieved during the period 2002 to 2008 (around value 4.4 ‰). The mean of the crude total population increase rate in the whole period 1990 to 2009 was 3 ‰ in the European Union. Sixteen countries from northern, western a southern Europe grew together more than the whole EU. Only eleven countries from central and south-eastern Europe had none population growth (Germany, Slovenia, Slovakia, Czech Republic and Poland) or visible loosed population (Hungary, Romania, Lithuania, Bulgaria, Estonia and Latvia). The worst situation was on the area Baltic states with annual decline indicator *CTPIR* on the level -7.2 ‰ with today value between -4 and -5 ‰.

The world's current (overall as well as natural) growth rate is about 1.14%, representing a doubling time of 61 years. We can expect the world's population of 6.9 billion to become 9 billion by 2050 if current growth continues. The world's growth rate peaked in the end of the 1960s at 21-22 ‰ and a doubling time of 35 years. Many Asian and African countries have high growth rates. Afghanistan has a current growth rate of 4.8%, representing a doubling time of 14.5 years! As you can see, population growth percentages are better utilized for short term projections. Current world population projections show a continued increase of population (but a steady decline in the population growth rate) with the population expected to reach between 7.5 and 10.5 billion in the year 2050.

The "median-variant" scenario of he U.N. Population Division remains almost the same as before - predicting a world with 9.2 billion people by mid-century, up from nearly 6.9 billion today. This means annual population growth at the level 3.4 ‰ in 2050 and this is the same level as in European Union today. It is true that population growth is diminishing due to the demographic transition and the peak of the world population size will be probably achieved during the 21st century (around 2070). The peak of the European Union population must be achieved much earlier (around 2030). But the big problem can be migration behaviour, namely international migration.

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