Statistical analysis of the demographic development in the countries of the European Union

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Abstract:

Included in the political, social and economic changes in Europe that started at the end of the last century, some demographic changes were also gradually implemented. Significant changes became evident with demographic development in individual countries of the European Union, especially in the countries of the former Socialist block. Demographic changes have not only been positive, but have also had a negative character. The important changes are particularly the lower rate of getting married, the rising average age of getting married, the spread of pre-marital sexual intercourse, delaying the age at which people give birth to children, the higher divorce rate, a lower fertility rate, a fall in child mortality, a prolonging of the middle age period of life, a worsening in the age structure, a bigger freedom of personal independence, a wider possibilities for studying, an increase in the economic activity of women, and the development of tourism., etc. The data mentioned is backed up in the work presented, which statistically analyses demographics in chosen indicators of the age structure and the population movements of the inhabitants of the countries of the European Union. It focuses on the changing patterns in the indicators in the course of the last number of years and how it compares in the framework of the countries of the EU. The initial data of 27 member countries of the EU were acquired from the public statistical evidence of Eurostat and it related mostly to 2009. As indicators show, the demographic development (some indicators come from previous calculations from the initial data) regards the possibility of comparing various countries selected: a percentage of representation of the inhabitants from 27 countries, population density, the proportion of active population, old–age index, the length of the middle age of life, the average age, the basic rate of getting marriage and divorce, the average age when giving birth, the amount of step-children, the total births given, the rate of mortality, infant mortality, and the natural growth and migratory growth for 1000 inhabitants. For this purpose, a certain method of analysis was used. By using this, the events indicated honored normal variables of zero level and unit variables regarding demographic indicators. The demographic parameters of 27 countries calculated characteristics of the level and variability; some possible relations were assessed through correlation. Special attention was put into establishing and evaluating homogenous groups from the countries from the point of view of some selected parameters. The final result of the analysis tries to set the order of the countries of the EU from the point of view of demographic development. For this purpose, the point system calculated indexes in order to develop the potential of individual countries.

Key words:

Countries of the European Union, demographic development, classifying countries, ranking of countries

Introduction

A demographic trend in the European Union was not going uniformly. Developed the Western European countries have followed the Western European standard, while the countries of the former socialist block significantly delayed for this development and only about 20 years ago got gradually closer to West European standards. The changes were accelerated to their admission to the European Union. In general, the demographic trend in developed countries, which represent the majority of EU countries, is not favorable. Amount of young generation is reduced, since it has long been seen as a result of a new lifestyle trend of declining birth rates. In contrast, due to increasing life expectancy increases the amount of people of retirement age. This leads to the aging population and greater loads productive component of the population.

The main goal of this work is to *quantify the development potential of human resources in European Union countries in terms of demographics.* To the comprehensive evaluation of human resources is necessary to access the basis of full range of indicators that characterize next the demographic development also life, economic and social level, employment, education, health conditions, crime, and possibly other descriptors, which can be described in human resources. However the content orientation covers the basic and starting position of demographic trends, including the state, structure and movement of population in each country. And this work is focused just on the statistical and demographic analysis of the European Union.

Materials and methods

Indicators that could be used as indicators of demographic development meeting the requirements of their availability and comparability in all countries of the European Union, were obtained from the EUROSTAT website. It is important that sources of relevant data indicators were not only attainable for exploring the needs in all evaluated sets of countries, but also that the indicators had the same meaning and content. Overview of the indicators shown in Table 1 and Table 2, while their default data refers to 2009.

Tab. 1 Demographic indicators of 2009 selected for statistical analysis (Part 1)

Countries of European Union		Total population at 1 January	Population as a percentage of EU-27 population	Population density (km²)	Proportional active population	Ageing index	Life expectancy at birth, by gender		Women per 100 men
							Males	Females	
		persons	%	persons	%	%	years	years	%
1	Belgium	10753080	2.2	353.1	66.0	101.18	77.3	82.8	104.1
2	Bulgaria	7606551	1.5	68.7	69.2	129.85	70.1	77.4	106.6
3	Czech Republic	10467542	2.1	135.0	71.0	105.67	74.2	80.5	103.8
4	Denmark	5511451	1.1	127.5	65.8	86.89	76.9	81.1	101.7
5	Germany	82002356	16.1	229.9	66.0	150.00	77.8	82.8	104.1
6	Estonia	1340415	0.3	30.9	68.0	114.77	69.8	80.2	117.1
7	Ireland	4450030	0.9	64.7	68.1	52.63	77.4	82.5	100.9
8	Greece	11260402	2.3	85.9	67.0	130.77	77.8	82.7	101.9
9	Spain	45828172	9.2	90.8	68.6	112.16	78.6	84.9	102.5
10	France	4369147	12.9	101.4	65.0	89.19	78.0	85.0	106.6
11	Italy	60045068	12.0	202.7	65.9	143.57	79.1	84.5	106.0
12	Cyprus	796875	0.2	85.7	70.1	74.85	78.6	83.6	101.7
13	Latvia	2261294	0.5	36.4	69.0	126.28	68.1	78.0	116.8
14	Lithuania	3349872	0.7	53.6	68.9	105.96	67.5	78.7	114.8

15	Luxembourg	493500	0.1	189.0	68.1	77.22	78.1	83.3	101.6
16	Hungary	10030975	2.0	107.9	68.8	109.40	70.3	78.4	110.6
17	Malta	413609	0.1	1303.6	70.0	88.68	77.8	82.7	100.9
18	Netherlands	16485787	3.3	487.2	67.3	84.75	78.7	82.9	102.1
19	Austria	8355260	1.7	101.1	67.5	115.23	77.6	83.2	105.4
20	Poland	38135876	7.6	121.9	71.3	87.58	71.5	80.1	107.1
21	Portugal	10627250	2.1	115.3	67.1	115.03	76.5	82.6	106.7
22	Romania	21498616	4.3	93.6	70.0	97.37	69.8	77.4	105.3
23	Slovenia	2032362	0.4	100.4	69.5	117.86	75.9	82.7	102.4
24	Slovakia	5412254	1.1	110.3	72.5	78.57	71.4	79.1	105.8
25	Finland	5326314	1.1	17.5	66.5	100.60	76.6	83.5	103.9
26	Sweden	9256347	1.9	22.5	65.6	105.99	79.4	83.5	101.1
27	United Kingdom	61595091	12.3	250.8	66.2	93.14	78.3	82.5	103.5

Tab. 2 Demographic indicators of 2009 selected for statistical analysis (Part 2)

	Countries of European Union	Mean age of women at child birth	Crude birth rate per 1000 inhabi-tants	Live births out-side marri-age	Total fertility rate	Crude morta-lity rate per 1000 inhabi-tants	Infant morta-lity per 1000 live births	Natu-ral popula-tion change	Migra-tion chan-ge	Marri-ages per 1000 per-sons	Divor-ces per 1000 per-sons
		years	‰	%	children	‰	‰	‰	‰	‰	‰
1	Belgium	29.58	11.8	45.71	1.84	9.72	3.4	2.2	5.9	4.01	3.0
2	Bulgaria	26.61	10.7	53.43	1.57	14.21	9.0	-4.3	-2.1	3.42	1.5
3	Czech Rep.	29.43	11.3	38.83	1.49	10.26	2.9	1.4	5.7	4.56	2.8
4	Denmark	30.51	11.4	46.76	1.84	9.96	3.1	1.9	2.8	5.97	2.7
5	Germany	30.23	8.1	32.74	1.36	10.42	3.5	-2.0	-0.1	4.62	2.3
6	Estonia	29.05	11.8	59.16	1.62	12.00	3.6	-0.5	0	4.00	2.4
7	Ireland	31.22	16.6	33.27	2.07	6.49	3.2	10.6	-6.2	4.83	0.7
8	Greece	30.22	10.5	6.57	1.52	9.62	3.1	0.9	3.1	5.25	1.2
9	Spain	31.04	10.8	34.47	1.40	8.40	3.3	2.9	1.1	3.79	2.1
10	France	29.91	12.8	53.74	2.00	8.52	3.9	4.5	1.1	3.90	2.1
11	Italy	31.10	9.5	23.50	1.42	9.85	3.7	-0.1	5.3	3.83	0.9
12	Cyprus	30.40	12.0	11.74	1.51	6.50	3.3	5.1	2.3	7.91	2.2
13	Latvia	28.44	9.6	43.47	1.31	13.22	7.8	-3.1	-2.1	4.40	2.3
14	Lithuania	28.60	11.0	27.95	1.55	12.55	4.9	-2.6	-4.6	6.15	2.8
15	Luxembourg	30.66	11.3	32.05	1.59	7.41	2.5	4.1	13.2	3.49	2.1
16	Hungary	29.07	9.6	40.82	1.32	13.00	5.1	-3.1	1.7	3.66	2.4
17	Malta	29.17	10.0	27.37	1.44	7.79	5.3	2.1	-3.8	5.68	:
18	Netherlands	30.74	11.2	43.28	1.79	8.14	3.8	3.0	2.3	4.36	1.9
19	Austria	29.67	9.1	39.35	1.39	9.26	3.8	0.3	2.5	4.24	2.2
20	Poland	28.61	10.9	20.24	1.40	10.09	5.6	0.9	0	6.57	1.7
21	Portugal	29.71	9.4	38.12	1.32	9.83	3.6	0	1.4	3.80	2.5
22	Romania	26.94	10.4	27.97	1.38	11.96	10.1	-1.5	-0.1	6.25	1.5
23	Slovenia	29.95	10.7	53.62	1.53	9.23	2.4	1.7	5.6	3.21	1.1
24	Slovakia	28.48	11.3	31.57	1.41	9.78	5.7	0.8	0.8	4.86	2.3
25	Finland	30.12	11.3	40.88	1.86	9.37	2.6	2.0	2.7	5.59	2.5
26	Sweden	30.69	12.0	54.41	1.94	9.73	2.5	1.9	6.7	5.08	2.4
27	U. Kingdom	29.42	12.8	46.29	1.94	9.09	4.7	3.5	3.0	4.40	2.2

In the processing of the numerical material there are statistical methods applied that allow you to achieve the desired outcomes of solution. They are chosen according to the purpose and set goals, their correct use can come to objective results, because they are known as generally accepted methodological apparatus for processing information.

In selected indicators such as basic methods there are aggregate one-dimensional numerical characteristics used, through which is level and variability expressed and evaluated. They are the arithmetic mean, standard deviation, coefficient of variation, minimum and maximum. It should be noted that the characteristics are calculated by a simple method where each country has equal weight. For the evaluation of dependencies is used ordinary correlation analysis. Due to the linear relationship, is it possible on the basis of correlation coefficient to assess the direction and degree of dependence.

When you divide homogeneous groups into regions in terms of more indicators, hierarchical analysis is applied - the furthest neighbor method with Euclidean distance. Given that the indicators have different measurement units, different levels and variability, they are immediately useless for cluster analysis. They are therefore converted to a comparable standard values that are dimensionless while have zero level and unit variability:

$$u_i = \frac{x_i - \bar{x}}{s_x} \ , \qquad \text{where: } u_i \ \dots \text{ normalized variable, } x_i \ \dots \text{indicator value,}$$

$$\bar{x} \ \dots \text{ arithmetic mean, } s_x \dots \text{standard deviation.}$$

For selecting a smaller number of indicators, where a significant importance is expected, there is factor analysis used. The point is to capture all the relevant characteristics of valued file based on indicators and takes care of avoiding duplication of information. Based on the relationship between indicators are created so-called factors, where individual indicators and their suitable or less suitable membership to the factor is expressed by load factor are included. According to the own value number of the factors is selected and from them by size of load factor and determining the relevance indicator is selected that the given factor represents.

Chosen indicators can be suitably used to quantify the development a potential of each country in terms of demographic developments and from that perspective to create the order. In the work for this purpose in a variety of evaluation the point method is chosen. On its basis development potential index for each of the countries is developed.

$$I_j^{RP} = \frac{\sum_{i=1}^{n} b_{ij} w_i}{\dfrac{\sum_{j=1}^{k} \sum_{i=1}^{n} b_{ij} w_i}{k}}$$

Where: b_{ij} …… point value of the i-th variable (indicator) in j-th country,

  w_i …… weight of the i-th variable (indicator),

  $b_{ij} w_i$ …… points score i-th variable (indicator) in j-th country,

  n …… number of variables (indicators),

  k …… number of evaluated EU countries.

Point value b_{ij} is equal to: $b_{ij} = \dfrac{/x_{ij} - x_{\min}/}{/x_{\max} - x_{\min}/}$ ……… scope of positive,

 $b_{ij} = \dfrac{/x_{\max} - x_{ij}/}{/x_{\max} - x_{\min}/}$ ……… scope of negative.

It holds that the higher the index value is, then the greater the level of development potential is as well. Higher index values over 1 indicate the above-average potential of the country and opposite, when the index value is less than 1, regard to below-average potential of the country.

Results

The European Union represents a non homogeneous set of countries differing not only in size and population, but also in many aspects of social life. Differences are reflected among others in the demographic development.

In evaluating and comparing demographic developments in individual countries is necessarily based on comparable data, which are expressed in average or relative form. Yet it is also advisable to have to rebuild the size of countries, which illustrate from the perspective of population in that country to the total population of all 27-member countries of the European Union is providing Fig. 1. It is evident that the differences are considerable. Over 10% of exhibit 4 countries, namely Germany, France, United Kingdom and Italy. Above 5% are 2 countries, Spain and Poland. In contrast, less than 1% does not reach 8 countries, which are Malta, Luxembourg, Cyprus, Estonia, Slovenia, Lithuania, Latvia and Ireland.
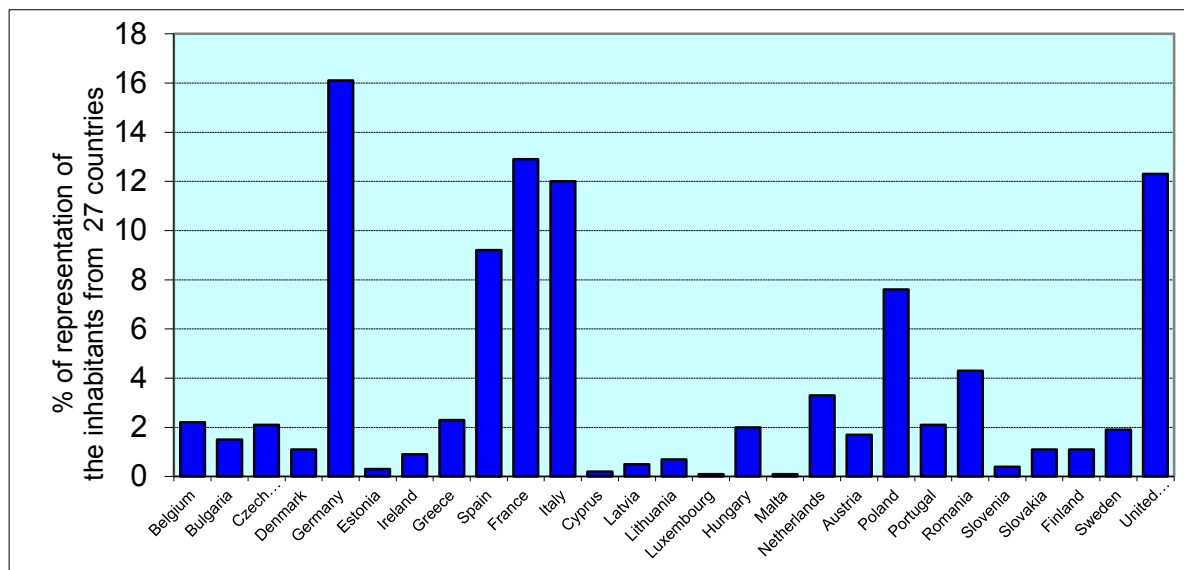
Fig. 1 Comparison of EU countries in terms of population

Population density in the European Union is very different and besides Malta varies roughly between 30 to 490 inhabitants per km^2. Malta has an extremely high density, which is 1,303.6 inhabitants per km^2.

In terms of age structure, it is generally known for all countries of the European Union that is getting worse. The population is getting older. More than half of the countries reached an ageing index greater than 100%, which means that in these countries, old age group exceeds the group of young at 65 to 72.5% share of the productive population aged 15 to 64 years. [The issue of age and aging of population of the countries of the European Union, the authors engaged in other submitted work.]

Important indicators of demographic natural movement are marriages (number of marriages per 1000 inhabitants), divorce (number of divorces per 1000 inhabitants), fertility (number of births per 1000 inhabitants), and mortality (number of deaths per 1000 inhabitants). In terms of changes in number of status of the population indicators of natural and migration growth in absolute terms or in relative terms per 1000 inhabitants are important.

Marriage rate and divorce rate

For a brief and clear description of the level and variability of marriage and divorce are used a summary characteristics:

Indicator	Average	Stand. deviat.	Coeff. of variation	Minimum	Maximum
Marriage rate	4.73	1.13	0.24	3.21	7.91
Divorce rate	2.07	0.60	0.29	0.70	3.00

The highest marriage rate is in Cyprus (7.91), the lowest in Slovenia (3.21).The highest marriage rate is in Cyprus (7.91), the lowest in Slovenia (3.21). Divorce rate is highest in Belgium (3.00), lowest in Ireland (0.7), in Malta data was not detected. From the characteristics it is evident that one marriage represents on average 0.44 divorces, which means that almost every second marriage is divorced. The lowest ratio of the number of divorces to the number of marriages is in Ireland (0.15), the highest in Belgium (0.75).
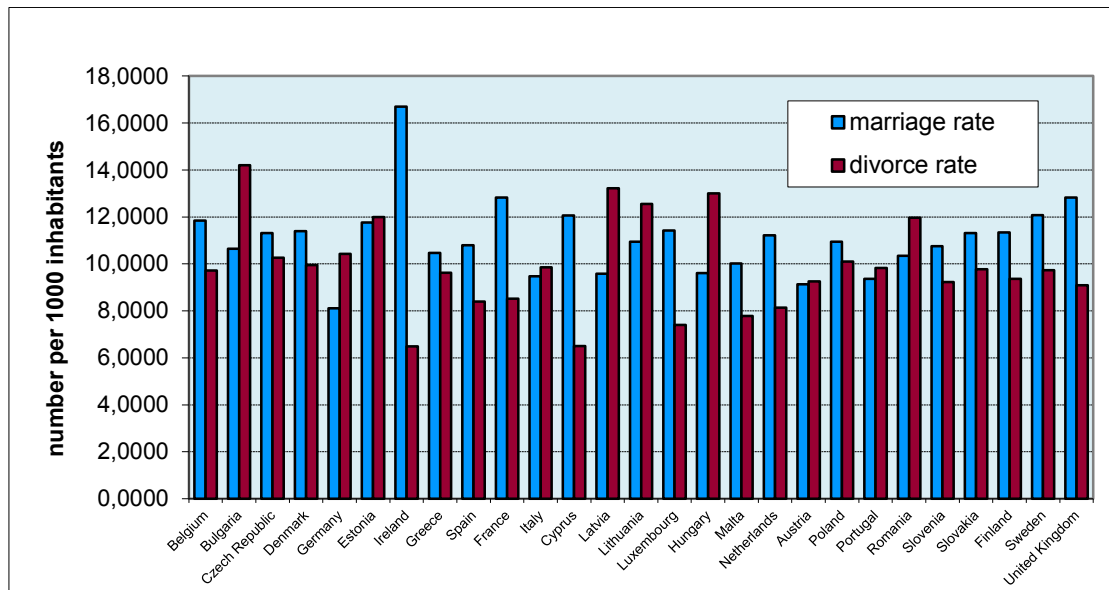
Fig. 2 Marriage and divorce rates in the EU in 2009

The cluster analysis deals with classification of countries into more homogenous groups. Based on the dendrogram (Fig. 3) there are clusters of countries formed according to the largest distance between neighbors is chosen number of groups. Thus set of countries is divided into the 3 groups. Given the groups, they still include different levels of marriage and divorce in each countries, therefore there are subgroups created for detailed analysis.
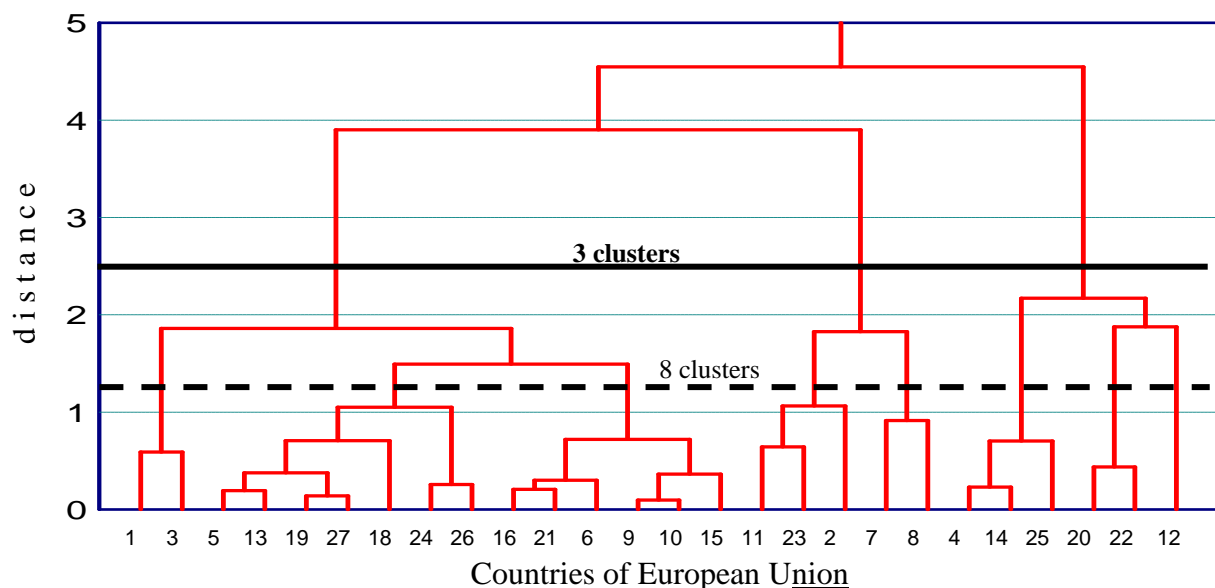
Fig. 3 Dendrogram of the EU (excluding 17-Malta) as marriage and divorce

Groups of countries and their subgroups, including individual countries are presented by a graph clusters in Fig. 4.
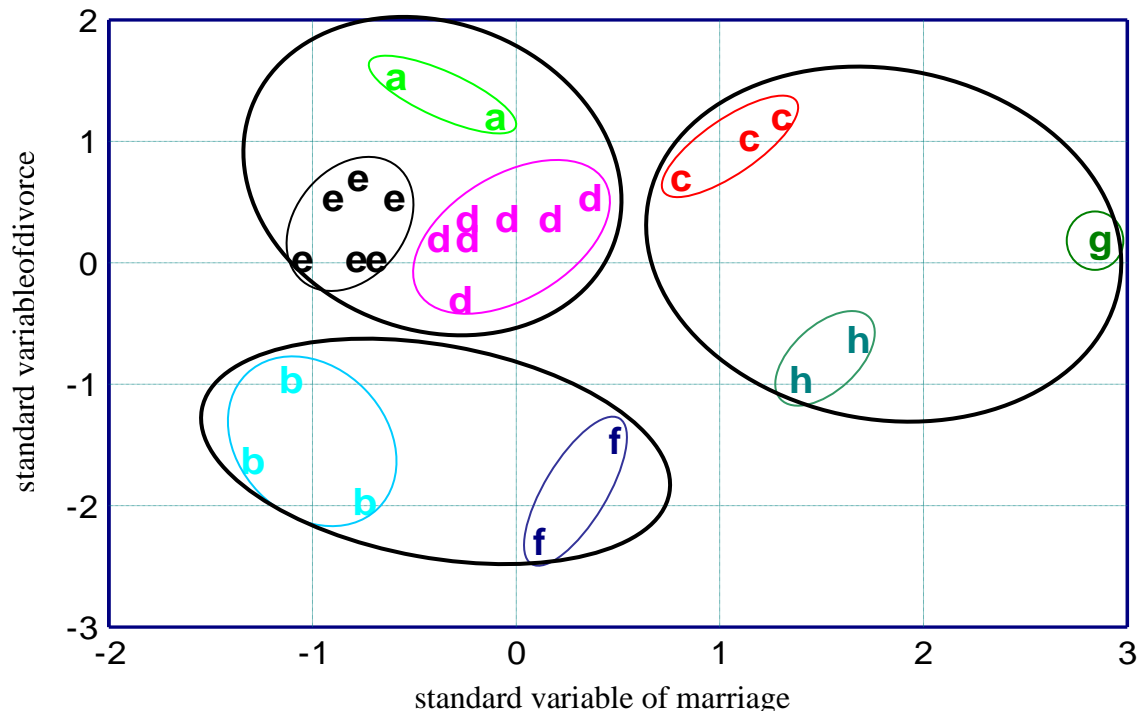
Fig. 4 Graph of clusters of EU countries (excluding 17-Malta) as marriage and divorce

Classification of countries into groups and subgroups, including evaluation of:

First group: 15 countries (55.56%)

> a) subgroup - *slightly below the average marriage rate, divorce rate above average*
> 1-Belgium, 3-Czech Republic
> d) subgroup - *roughly the average marriage rate and divorce rate*
> 5-Germany, 13-Latvia, 19-Austria, 27-United Kingdom, 18-Netherlands, 24-Slovakia, 26-Sweden
> e) subgroup - *below the average marriage rate, average to slightly above-average divorce rate*
> 16-Hungary, 21-Portugal, 6-Estonia, 9-Spain, 10-France, 15-Luxembourg

Second group: 5 countries (18.52 %)

> b) subgroup - *below the average marriage rate and divorce rate*
> 11-Italy, 23-Slovenia, 2-Bulgaria
> f) subgroup - *slightly above average marriage rate, divorce rate below the average*
> 7-Ireland, 8-Greece

Third group: 6 countries (22.22%)

> c) subgroup - *above the average marriage rate as well as divorce rate*
> 4-Denmark, 14.Lithuania, 25-Finland
> h) subgroup - *higher than average marriage rate, divorce rate slightly below the average*
> 20-Poland, 22-Romania
> g) subgroup - *significantly above the average marriage rate, the average divorce rate*
> 12-Cyprus

Unclassified 17-Malta (3.7%)

The birth rate and mortality rate

Birth rate means the number of live births per 1000 inhabitants, unit of measure is per thousand (‰).Another indicator is the total fertility rate, meaning the number of children in average born to one woman during her productive life. The mortality rate is comparable to the fertility indicator because it measures the number of deaths per 1000 population (‰).

The level and variability characterize summary features:

Indicator	Average	Stand. deviat.	Coeff. of variation	Minimum	Maximum
Birth rate	11.05	1.59	0.14	8.11	16.69
Mortality rate	9.87	1.94	0.20	6.49	14.21

In general, the birth rate is higher than mortality rate, so throughout the European Union there is a natural growth and the population is growing. According to the individual countries it has a positive gain only 18 countries and the remaining 9 countries have a natural decrease. Morality has somehow larger absolute and relative variability has mortality. As for individual countries, Ireland has the most favorable data, which shows the highest birth rate (16.6‰), while the lowest mortality (6.49‰). The lowest birth rate (8.1‰) is in Germany, the highest mortality rate (14.21‰) in Bulgaria.
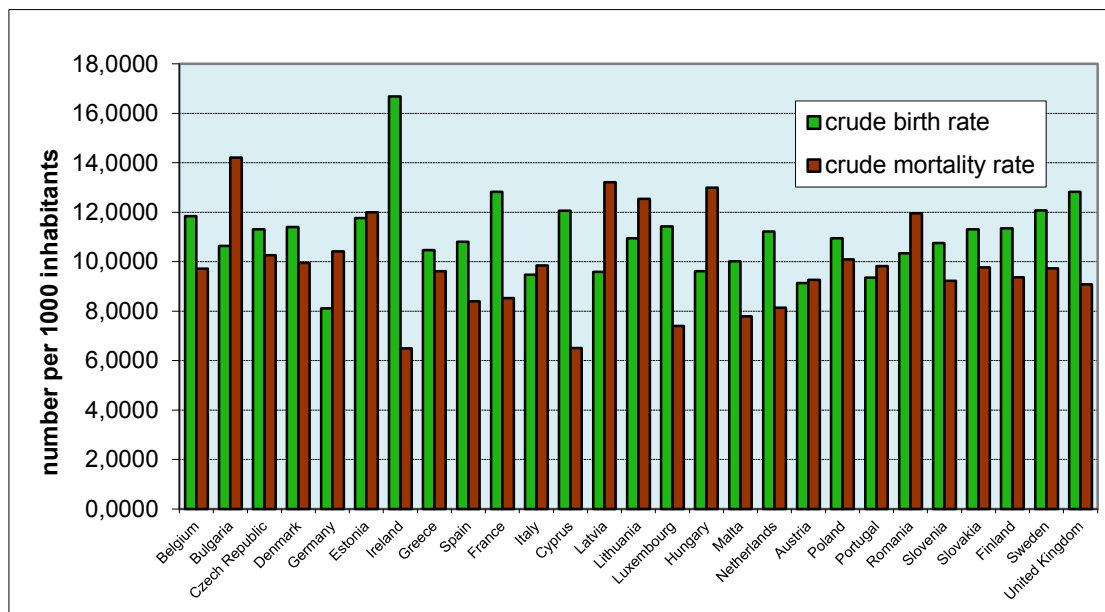

Fig. 5 The birth rate and mortality rate in the EU in 2009

In assessing the fertility and mortality it is suitable not only rating by country, but also the division of countries into groups that are close in terms of birth rate and in terms of mortality rate. Drawn up dendrogram (Fig. 6) based on cluster analysis suggests that a suitable division appears to be the creation of 4 groups, which can be further divided into more homogeneous subgroups of countries.

To be able to evaluate the division of countries, there was a graph of clusters prepared (Fig. 7), which allows graphically describe the groups and subgroups of countries according to levels of fertility and mortality achieved. The clue is to normalize the variables of both indicators, whose zero values characterize the average level, positive values characterize the above-average level and negative values characterize the below average level.
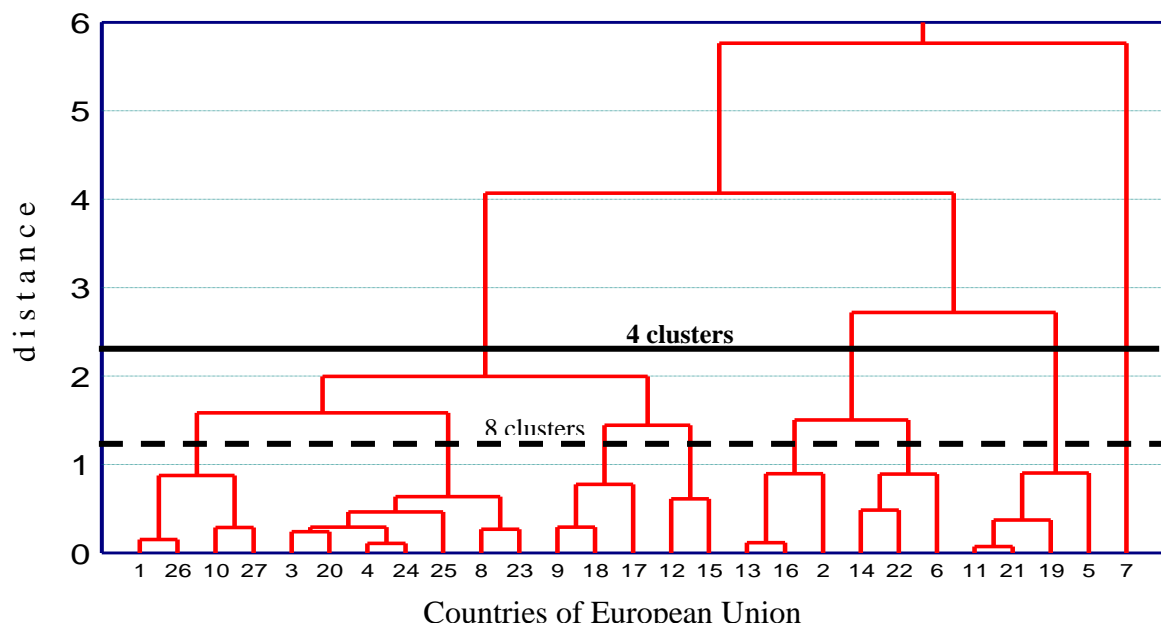
Fig. 6 Graph of clusters of EU countries by birth rate and mortality rate
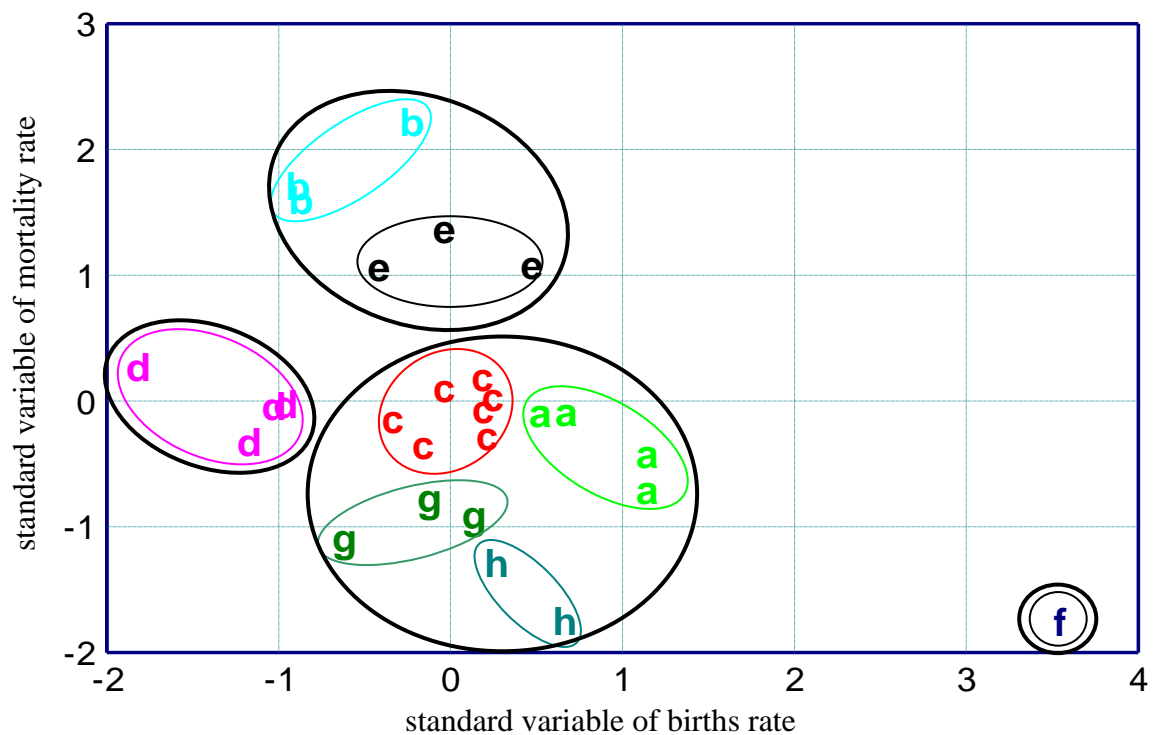
Fig. 7 Graph of clusters of EU countries by birth rate and mortality rate

Classification of countries into groups and subgroups, including evaluation of:

First group: 16 countries (59.26%)

    a) subgroup - *higher than average birth rate, slightly below average mortality rate*
    1-Belgium, 26-Sweden, 10-France, 27-United
    c) subgroup - *the average fertility and mortality*

3-Czech Republic, 20-Poland, 4-Denmark, 24-Slovakia, 25-Finland, 8-Greece, 23-Slovenia

g) subgroup - *the average birth rate, below average mortality rate*
9-Spain, 18-Netherlands, 17-Malta

h) subgroup - *slightly above average birth rates, below average mortality rate*
12-Cyprus, 15-Luxembourg

Second group: 6 countries (22.22%)

b) subgroup - *slightly below the average birth rate, above-average mortality rate*
13-Latvia, 16-Hungary, 2-Bulgaria

e) subgroup - *the average birth rate, above-average mortality rate*
14-Lithuania, 22-Romania, 6-Estonia

Third group: 4 countries (14.82%)

d) subgroup - *below average birth rate, the average mortality rate*
11-Italy, 21-Port, 19-Austria, 5-Germany

Fourth Group: 1 country (3.70%)

f) subgroup - *significantly higher than average birth rates, below average mortality rate*
7-Ireland

Natural and migration growth

Especially important demographic indicators of movement are the natural and migration growth, which may be expressed in absolute and relative terms. Given the need for mutual comparison of growth of the European Union in this case are expressed in relative terms. Relative natural increase applies to 1000 population and is estimated as the difference between live births and deaths per 1000 inhabitants. Similarly, the relative increase in migration is understood as the difference between immigrant and emigrant per 1000 inhabitants.

The level and variability characterize summary features:

Indicator	Average	Stand. deviat.	Coeff. of variation	Minimum	Maximum
Natural rate	1.21	3.07	2.54	- 4.30	10.60
Migration rate	1.79	3.93	2.20	- 6.20	13.20

Ireland and Luxembourg show very different values compared to other European Union countries show. Ireland achieves an extremely high natural growth 10.6‰ at high migration loss 6.2‰, on the other hand Luxembourg has an extremely high migration growth 13.2‰ and while even natural growth 4.1‰.

During the segmentation of the European Union with the help of cluster analysis there was 5 groups created, as documented in Fig. 8. Number of groups was drawn from Euclidean distance, using the furthest neighbor method, which graphically presents the processed dendrogram (Fig. 8).Specific assignments of each country into groups are shown in the graph of clusters (Fig. 9).
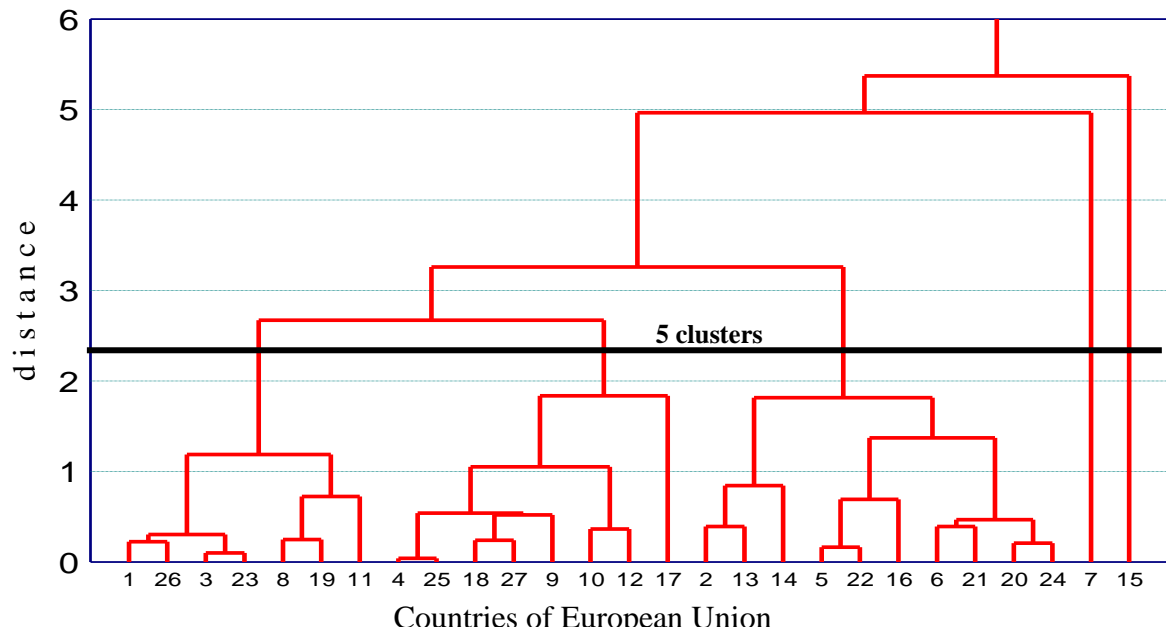
Fig. 8 Dendrogram of the EU under the natural and migration relative growth
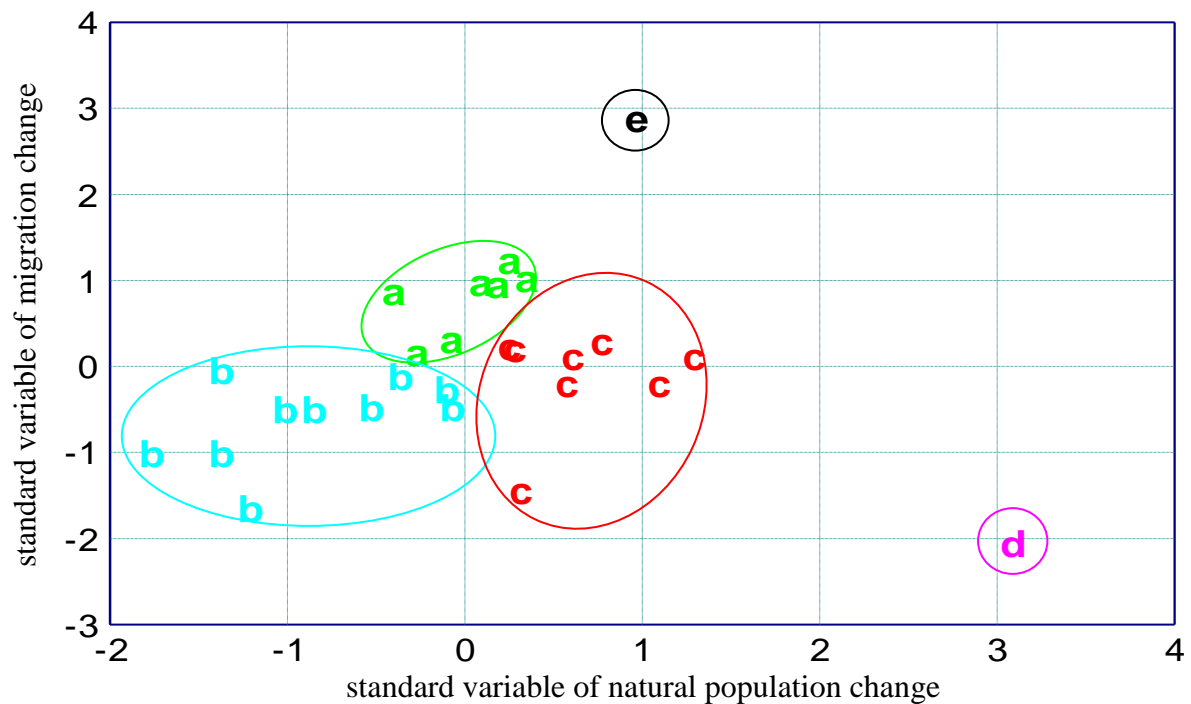
Fig. 9 Graph of clusters of EU countries by the natural and migration growth

Classification of countries into groups and subgroups, including evaluation of:

First group: 7 countries (25.93%)

 a) *average natural growth, slightly above average migration growth*
 1-Belgium, 26-Sweden, 3-Czech Republic, 23-Slovenia, 8-Greece, 19-Austria,11-Italy

Second group: 6 countries (37.04%)

 b) *below average natural and migration growth or loss*
 2-Bulgaria, 13-Latvia, 14-Lithuania, 5-Germany, 22-Romania, 16-Hungary,

6-Estonia, 21-Portugal, 20-Poland, 24-Slovakia

Third group: 8 countries (29.63%)

c) *slightly above average natural growth, mainly the average migration growth*
4-Denmark, 25-Finland, 18-Netherlands, 27-United Kingdom, 9-Spain, 10-France, 12-Cyprus, 17-Malta

Fourth Group: 1 country (3.70%)

d) *extremely above average natural growth, migration loss*
7-Ireland

Fifth Group: 1 country (3.70%)

e) *above average natural growth, extremely above average migration growth*
15-Luxembourg

In cases of negative normalized values of additions regards the below average level of growth, which in most cases, is transferred in the decrease.

Depending between indicators

To assess the dependence between each demographic indicators used, a correlation matrix were drawn and from which only relationships for which the correlation coefficient shows absolute value r ≥ / 0.70/ were selected.

Tab. 3 Selection of correlation coefficients of the correlation matrix

Demographic rate		Life expec-tancy at birth by gender females	Women per 100 men	Mean age of women at child birth	Crude birth rate	Total ferti-lity rate	Crude morta-lity rate	Infant morta-lity per 1000 live births	Natural popula-tion change
Ageing index					–0.77				–0.73
Life expectancy at birth by gender	males	0.92	–0.79	0.82		–0.81	–0.70		
	females			0.85		–0.78	–0.78		
Women per 100 men							0.72		
Mean age of women at child birth							–0.77	–0.87	
Marriages						0.79			0.80
Divorces									–0.91

Some dependences of the high degree of correlation are immediately causal, such as:
- the higher birth rate, the more natural growth and the lower index of age,
- the higher mortality rate, the less natural growth,
- the larger the total fertility rate, the higher birth rates, etc.

Other high correlations could be mediated, for example:
- in life expectancy between men and women is high dependence, but this is not a causal dependency, both indicators are together strongly influenced by the living.

Classification of countries according to selected indicators:

For purposes of classification of countries based on demographic development it is suitable to choose the lowest number of indicators that demographic developments in European Union countries affected. From all these data, generated six factors were therefore based on factor analysis. In these six factors there are indicators in the role of indicators of demographic development included, this development as a whole, adequately characterize and at the same time do not double information. Indicators are expressed in relative form, to be comparable, although there are significant differences in the number of inhabitants of each country.
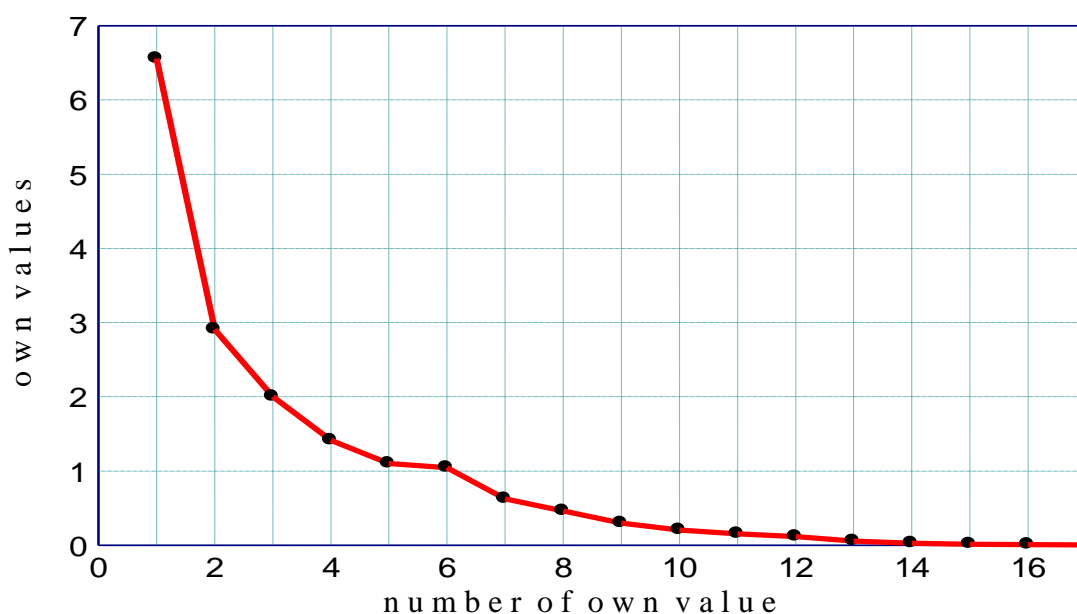
Fig. 10 Graph of own values method of principal components of factor analysis

Table of variance of factor analysis:

Factor	Own value	Percent	Cumulative percent
1	6.56	38.6%	38.6%
2	2.91	17.1%	55.7%
3	2.00	11.8%	67.5%
4	1.42	8.3%	75.8%
5	1.10	6.5%	82.3%
6	1.05	6.2%	88.4%

Demographic indicators presenting the individual factors by factor loads:

1. factor: the life expectancy of man, the crude death rate, the life expectancy of women, the average age of the birth, the natural increase per 1 000 inhabitants,
2. factor: the ageing index, the crude birth rate,
3. factor: the proportion of illegitimate children of live births, the total fertility,
4. factor: the number of divorces per 1000 inhabitants, the migration change, the percentages of the population of the 27 EU countries,
5. factor: the population density, the number of marriages per 1000 inhabitants
6. factor: the population density, the number of divorces per 1000 inhabitants, the number of marriages per 1000 inhabitants.

For the analysis including classification of the European Union countries and their classification according to demographic indicators were chosen:

- the life expectancy of man (probability of life expectancy at birth in years),
- the age index (the proportion of age group of 65 and the multi-age group of 0-14-year-old in %),
- the total fertility rate (number of live born children at 1 woman in productive age),
- the migration change(the difference in the number of immigrants and emigrants per 1000 persons in ‰),
- the marriage rate (number of marriages per 1000 inhabitants in ‰).

Life expectancy of men (as well as the life expectancy of women) characterizes the living standards of residents, improve living standards in developed countries is longer life expectancy.

Ageing index is an indicator of structure of the population and reflects the degree of aging of the population. The ageing index is larger, the population is older and its structure is unfavorable. Total fertility rate highly correlated with birth rate and its higher level indicates healthy demographic trends in the country. For changes in the number and structure of the country's population are in addition to fertility and mortality also indisputable importance immigration and emigration quantified the migration change(migration increase or loss per 1000 inhabitants).Because the family is the basic component of a thriving society, demographic indicator of marriages is important.

Population density, even though, according to factor analysis could be chosen, was not included between the indicators due to extreme values in some countries. Did not choose or divorce due to the fact that Malta was not legitimate at that time.

Tab. 4 Characteristics of the level and variability of selected demographic indicators of set of 27 EU countries in 2009

Indicators of demographic development	Average	Standard deviation	Variation coefficient	Minimum	Maximum
Life expectancy at birth by gender males	75,30	3,84	0,05	67,50	79,40
Ageing index	103,53	22,05	0,21	52,63	150,00
Total fertility rate	1,59	0,23	0,15	1,31	2,07
Migration change	1,79	3,93	2,20	– 6,20	13,20
Marriages	4,73	1,13	0,24	3,21	7,91

In terms of level indicators are incomparable, in terms of variability, however, they are. The lowest variability 5% has the life expectancy of men, significantly the highest variability 220% reaches the migration change. Migration loss is typical of island countries (Ireland, Malta), the Baltic countries (Latvia, Lithuania) and Balkan (Bulgaria, Romania). In contrast, migration growth above 5‰ exhibit Sweden, Belgium, Czech Republic, Slovenia, Italy and especially Luxembourg, where the migration change reaches extreme 13.2‰.

While using cluster analysis the European Union countries were divided into homogeneous groups through point method described in the methodological section they can be evaluated individually and determine their ranking in terms of selected indicators. For this is necessary in each indicator to decide on the scope of its direction, and positive direction of scope means that higher values of indicator are more favorable. In contrast, in the case of negative scope increase values of indicator is a negative phenomenon. Indicators can also be attributed to weight according to their importance. It is appropriate that the average weights were equal to one.

Indicator	The direction of the scope	Weigh (w_i)
The life expectancy of men	positive	1.1
Ageing index	negative	1.1

Total fertility rate	positive	1.3
The migration change	positive	0.8
Marriages	positive	0.7

For each country there were calculated point values of indicators b_{ij} (Table 5) and obtained by multiplying them the assigned weight points score of $b_{ij}w_i$. Sum of these partial scores, despite all the indicators were calculated for every country the total score $\Sigma\ b_{ij}w_i$ and set them by dividing the average score indices of development potential I_{RP} (Table 6). Countries with the development potential index more than 1 have in terms of the demographic development above average rating that is more favorable demographic development than countries with an index value less than 1. According to the value of development potential index was then set order of countries.

Tab. 5 The point values of b_{ij} selected indicators

| Countries of European Union		Life expectancy at birth by gender males	Ageing index	Total fertility rate	Migration change	Marriages
1	Belgium	0.8235	0.5014	0.6974	0.6237	0.1702
2	Bulgaria	0.2185	0.2069	0.3421	0.2113	0.0447
3	Czech Rep.	0.5630	0.4553	0.2368	0.6134	0.2872
4	Denmark	0.7899	0.6481	0.6974	0.4639	0.5872
5	Germany	0.8655	0.0000	0.0658	0.3144	0.3000
6	Estonia	0.1933	0.3618	0.4079	0.3196	0.1681
7	Ireland	0.8319	1.0000	1.0000	0.0000	0.3447
8	Greece	0.8655	0.1975	0.2763	0.4794	0.4340
9	Spain	0.9328	0.3886	0.1184	0.3763	0.1234
10	France	0.8824	0.6245	0.9079	0.3763	0.1468
11	Italy	0.9748	0.0660	0.1447	0.5928	0.1319
12	Cyprus	0.9328	0.7718	0.2632	0.4381	1.0000
13	Latvia	0.0504	0.2436	0.0000	0.2113	0.2532
14	Lithuania	0.0000	0.4523	0.3158	0.0825	0.6255
15	Luxembourg	0.8908	0.7475	0.3684	1.0000	0.0596
16	Hungary	0.2353	0.4170	0.0132	0.4072	0.0957
17	Malta	0.8655	0.6298	0.1711	0.1237	0.5255
18	Netherlands	0.9412	0.6701	0.6316	0.4381	0.2447
19	Austria	0.8487	0.3571	0.1053	0.4485	0.2191
20	Poland	0.3361	0.6411	0.1184	0.3196	0.7149
21	Portugal	0.7563	0.3591	0.0132	0.3918	0.1255
22	Romania	0.1933	0.5405	0.0921	0.3144	0.6468
23	Slovenia	0.7059	0.3301	0.2895	0.6082	0.0000
24	Slovakia	0.3277	0.7336	0.1316	0.3608	0.3511
25	Finland	0.7647	0.5073	0.7237	0.4588	0.5064
26	Sweden	1.0000	0.4520	0.8289	0.6649	0.3979
27	United King.	0.9076	0.5840	0.8289	0.4742	0.2532

Tab. 6 Development potential indexes and the order of the European Union in terms of demographic development in 2009

	C o u n t r i e s of European Union	Total score $\sum b_{ij} w_i$	Development potential index I_{RP}	Ranking of countries
1	Belgium	2.9821	1.3116	**10**
2	Bulgaria	1.1130	0.4895	**26**
3	Czech Republic	2.1197	0.9323	**13**
4	Denmark	3.2706	1.4384	**4**
5	Germany	1.4991	0.6593	**23**
6	Estonia	1.5142	0.6660	**22**
7	Ireland	3.5564	1.5641	**1**
8	Greece	2.2158	0.9745	**12**
9	Spain	1.9949	0.8774	**15**
10	France	3.2417	1.4257	**6**
11	Italy	1.8996	0.8355	**18**
12	Cyprus	3.2677	1.4372	**5**
13	Latvia	0.6697	0.2945	**27**
14	Lithuania	1.4119	0.6210	**24**
15	Luxembourg	3.1228	1.3734	**7**
16	Hungary	1.1274	0.4958	**25**
17	Malta	2.3341	1.0266	**11**
18	Netherlands	3.1153	1.3701	**8**
19	Austria	1.9754	0.8688	**17**
20	Poland	1.9850	0.8730	**16**
21	Portugal	1.6454	0.7237	**20**
22	Romania	1.6312	0.7174	**21**
23	Slovenia	2.0025	0.8807	**14**
24	Slovakia	1.8729	0.8237	**19**
25	Finland	3.0615	1.3465	**9**
26	Sweden	3.4852	1.5328	**2**
27	United Kingdom	3.2749	1.4403	**3**

In terms of demographic development Ireland was ranked at the first place due to the highest fertility, lowest ageing index, above average life expectancy and marriage, and even at the highest migration loss. Other countries in order of favorable demographic trends are Sweden, the United Kingdom, Denmark, and Cyprus. In contrast, Lithuania occupied the last place primarily because it has the lowest life expectancy, very high aging index, low fertility, migration and loss of below-average marriages. Greater adverse demographic trends show Bulgaria, Hungary, Latvia, Germany, Estonia, and Romania as well. Surprisingly, bad location in Germany is significantly influenced by the highest ageing index and considerably low fertility.

In general, the favorable demographic development with above-average the development potential index is manifested mainly in the countries of the north and northwest Europe, while the unfavorable demographic development with below-average the development potential index showing especially the Baltic and Balkan countries.
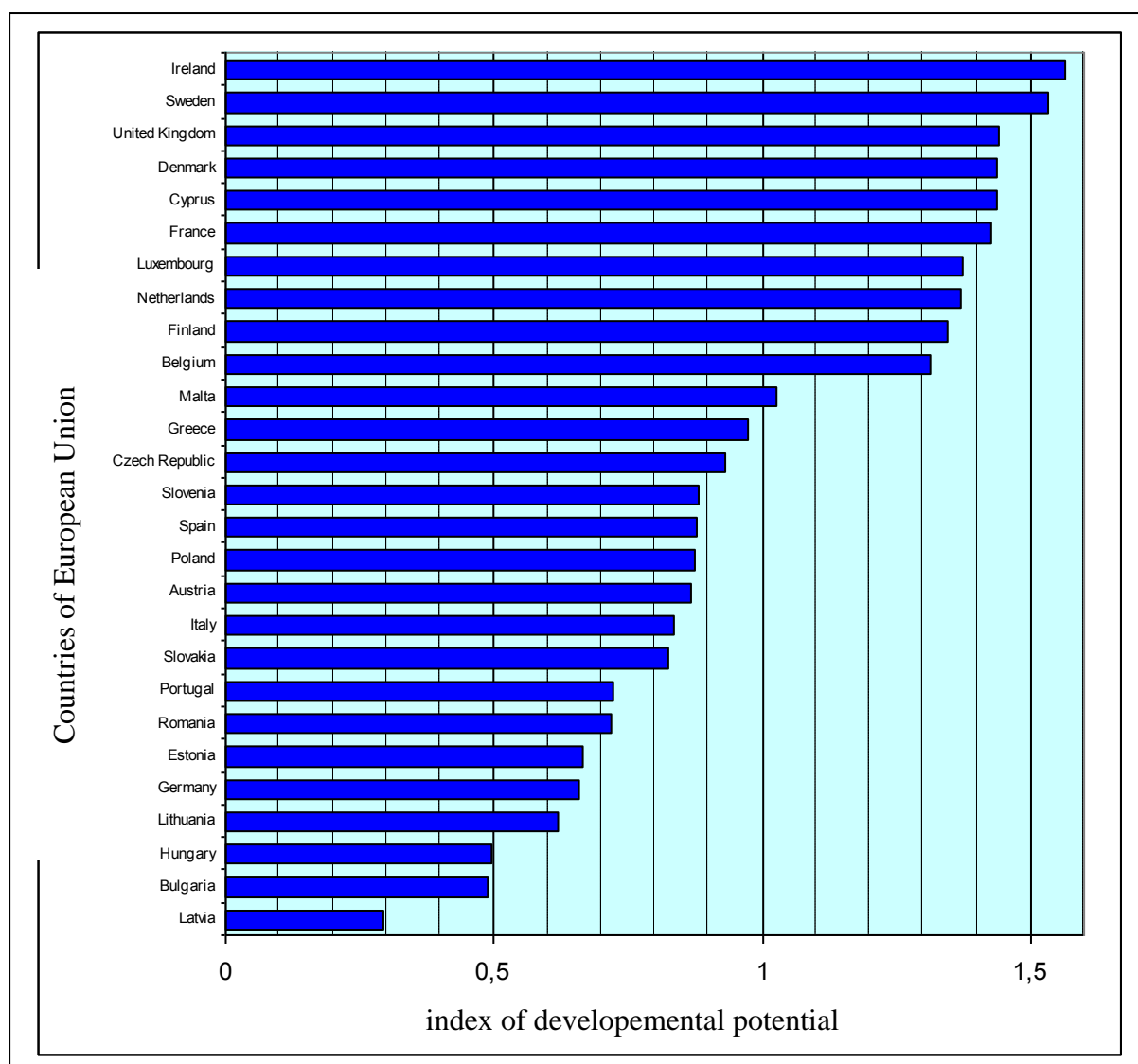
Fig. 11 The order of the European Union under the development potential index in terms of demographic development in 2009

Conclusions

The most important factor of social development is human capital. Within each countries, not just the roughly conceived human resources, that is about the number, structure, natural and migratory movement of population, but also about their life, economic and social levels, especially their education and the lessons learned and practical experience in solving current issues and future developments in order to increase prosperity and quality of life.

Base and initial state of socio-economic analysis in that sense is analysis of demographic trends. And statistical analysis of demographic development in the European Union is engaged in this presented work. In addition to evaluation of the level, variability and correlation indicators obtained from the website of Eurostat, the analysis focused on the classification of the European Union by pairs of indicators: marriages - divorce rates, fertility - mortality, natural increase - increase in migration. Homogeneous set of countries was done through cluster analysis divided into groups, which included the country in terms of the indicators used near each other. A key result of work is the classification and completion of the order of the EU countries according to five indicators selected on the basis of factor analysis. For this purpose, development potential indexes were calculated for every country, which quantitatively evaluate the favorable or unfavorable demographic development.

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