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## Population ageing in Europe

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### Abstract

The aim of this article is the presentation of the level and perspectives of population ageing taking into account as a starting point the year 2005 and perspectives until 2045. Based on UN data, an ageing index in 2005 ranged from 33 in Albania to 138 in Italy. Till 2045 this index will have doubled, reaching its highest level in Germany (261) and Italy (251), though the most rapid population ageing will be recorded in Latvia, Ukraine, Estonia and Russia which will be influenced by increasing life expectancy and decrease in fertility. In case of parent support ratio (WWM), it should be stated that in more developed and wealthier countries where the level of social and medical care is high and the elderly are well provided for, while in poorer countries with less developed social infrastructure, the fact that which number of „theoretical children” will have or be able to take care of their „theoretical parents” is of great importance. In places where traditions of intergenerational families are strong, the issues of quiet evening of one’s life will be more optimistic. The level of potential support ratio (WPW) will be changeable in Europe in the near future. It means that in countries with more rapid ageing less and less group of people will contribute to the pensions of retirees. So, if the parent support ratio represents more social situation (the level of medical and social care), the potential support ratio is significant from economic aspects (pensions, allowances) and is very important while making population projections. Based on the analysis of situation in particular countries, it can be concluded that population ageing process is unprecedented and will deepen in all states, thus precautions should be taken to hamper unfavourable trends, particularly in fertility decline. In the level of parental support, the consequences of this phenomenon will largely depend on looking for system solutions, which, on one hand, allow to preserve generational ties and, on the other hand, they create conditions for active ageing of disabled persons and leading a peaceful existence of bedridden people. In economic aspect, one of solutions of preventing security systems is return migration, which would allow to maintain relations between the working and post-working population. Therefore, an active policy and widely understood actions in social and economic-financial sphere would be an underlying cause of expected success in alleviating negative consequences of ageing.

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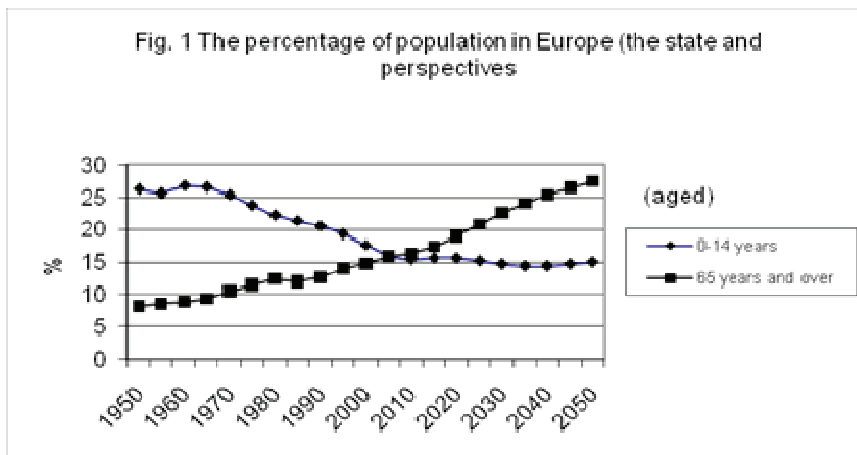
*Keywords:* Population; Ageing; Europe.

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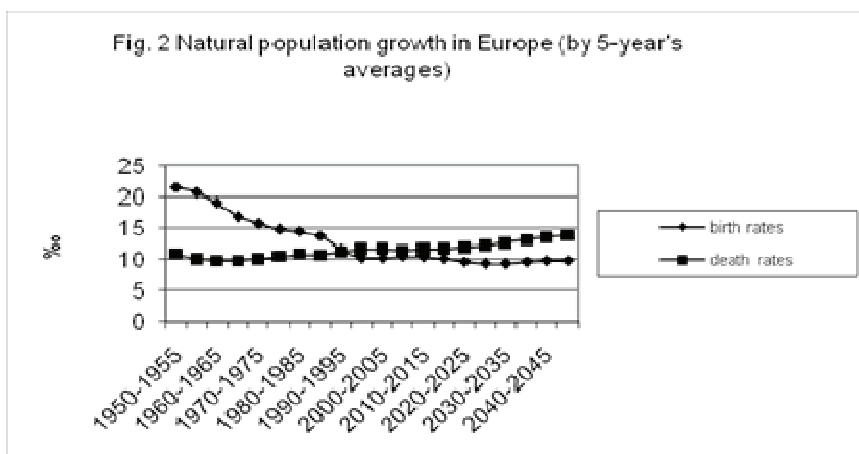
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1. Introduction

The process of population aging poses multi-faceted and difficult challenges to the individual and society. Psychological, medical, social, economic and cultural dimensions of the problem are being faced by many countries. Clear disproportions and a lack of balance between population numbers of different age groups have been observed with concern for some time now in Poland [1] as well as in other European countries [2, 3, 4]. This phenomenon leads to aging in many countries, especially in Western Europe. Data contained in the World Population Prospects published in 2008 [5] indicate that the proportion of young people (age 0-14) and the proportion of elderly people (age over 65) in the population of Europe were equal in 2005. In spite of some exceptions occurring in many countries for historical reasons, demographic disproportions across our continent will only deepen (Fig. 1). The phenomenon of population aging, or a disproportion between primarily the youngest and the oldest age groups, is the product of the components of natural migration – primarily the dynamics of birth rate and mortality at a young age (especially infants) and the population migration balance. While, based on long term trends, birth and mortality rates are easier to predict (Fig. 2), migration forecasts are much more difficult to produce. In migration forecasting, the predictions may be more vague because human migration is a much more complex and spontaneous process, and thus often unpredictable.



Source: Own elaboration based on World Population Prospects



Source: Own elaboration based on World Population Prospects

A great deal has been written about the phenomenon of population aging. A large number of publications by S. Kurek [6, 7] cover this issue. Europe is often called the Old Continent, not only for historical reasons. In order to show a rather current demographic situation in European countries, an attempt was made in this work to present the state and perspectives of the aging process within a spatial context. The analysis was based on the “medium variant” projection provided by the United Nations (World Population Prospects, published in April of 2009). Using traditional geographic boundaries of the continent, politically independent mini-states such as Andorra, Liechtenstein, Monaco, San Marino, and the Vatican were excluded from analysis. Territories that are not independent (including autonomous areas) were also excluded. The demographic situation in those areas has no significance for global or regional changes across the continent. Hence, 40 territorial units were taken into account. The indices used for comparison purposes were calculated for years separated by twenty-year periods: 2005, 2025, 2045.

$$W_{IS} = \frac{L_{(+65)}}{L_{(0-14)}} \times C$$

$W_{IS}$  – ageing index

$L_{(+65)}$  – population aged 65+

$L_{(0-14)}$  – population aged under 5

$C$  – constans (= 100)

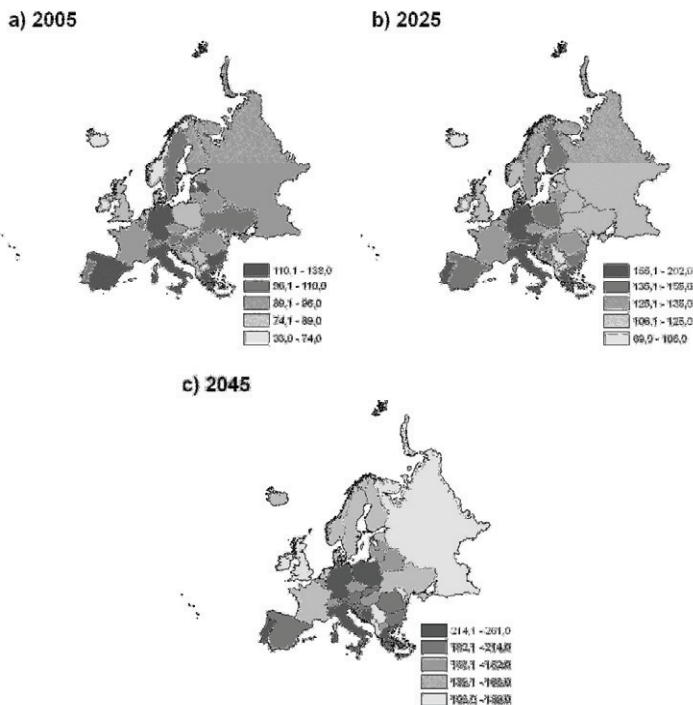
## 2. Results

A basic but important measure of population aging is the demographic aging index ( $I_{DA}$ ). The index describes the quantitative relationship between the oldest and the youngest age group. It is defined as the number of people aged 65 and over per 100 people under age 15 (0-14). For Europe, 2005 was a borderline year, when the shares of both groups in the general population became roughly the same. However, the index values were significantly different between different countries (Fig. 3a). The aging index ranged from 33 for Albania to more than 120 for: Bulgaria (126), Greece (125), Germany (132), and Italy (138). Population projections to 2025 indicate that in some countries such as Albania, Montenegro, Ireland, Iceland, Luxembourg, and Moldova, there will still be more youth than the elderly (Fig. 3b). However, in 2045, the aging index will exceed 100 in all countries, which will mean that there will be more people in the group of 65 and older than in the group of 0-14 year olds. Moreover, population forecasts made 20 years ago suggested that there will be twice as many elderly as young people in Germany. Projections made now for 2045 suggest that not only in Germany but in 12 other European countries the aging index will exceed 200 (Fig. 3c).

The highest index values are forecasted for Germany (261), Italy (251), and Bosnia-Herzegovina (243). This will be caused directly by a lowered birth rate and possible migrations, but also an increasing human life span, which will be a significant factor as well (Tab. 1). While between 2000 and 2005 life expectancy in four European countries was below 70 for both sexes taken together, and exceeded 80 in four other countries, it is projected that between 2040 and 2045 life expectancy will not exceed 80 in only 15 European countries.

Population forecasts suggest that in the period 2005-2025 (Fig. 4a), the pace of population aging will be highest in Malta, Bosnia-Herzegovina, Germany, Poland, and Portugal, and lowest in the eastern part of the European continent: Latvia, the Ukraine, Estonia, and Russia. In turn, in the period 2025-45 (Fig. 4b), the group of countries including Bosnia-Herzegovina, Portugal, and Poland, where the pace of population aging is highest, will be joined by Spain, Slovakia, and Romania. Relatively weak population aging dynamics will be observed in Finland, Denmark, and Sweden. It was in Scandinavia where the process of population aging was first observed, however in recent years, it has clearly slowed down. Comparing trends in index changes for two 20-year periods, it may be concluded (Fig. 4c) that although the population aging process has slowed down in many countries (especially Finland, the Netherlands, Denmark), it will continue to intensify in most European countries – especially Spain, Latvia, and Belarus.

Fig. 3 The level of demographic ageing in European states by an ageing index (Wis)



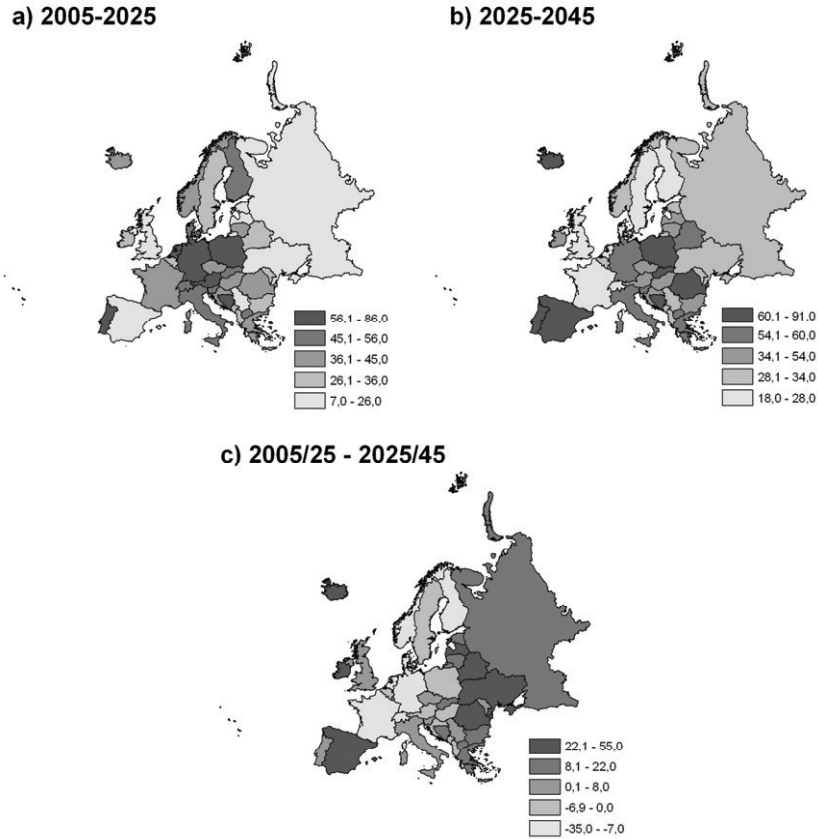
Source: Own elaboration based on World Population Prospects

Table 1 Average life expectancy in European states – the level and perspectives

Country	2000-05	2020-25	2040-45	Country	2000-05	2020-25	2040-45
Albania	75,7	78,6	81,1	Lithuania	71,9	74,9	78,0
Austria	78,8	82,2	84,4	Luxemburg	78,3	81,8	84,1
Belarus	68,4	72,4	75,5	Macedonia	73,4	76,2	78,9
Belgium	78,2	82,3	84,5	Malta	78,7	81,5	83,7
Bosnia i Herzeg.	74,4	77,1	79,6	Moldova	67,4	71,0	74,3
Bulgaria	72,1	76,1	78,9	Montenegro	74,3	76,5	79,2
Croatia	74,9	78,6	81,1	Netherlands	78,7	81,7	83,7
Cyprus	79,1	81,3	83,4	Norway	79,4	82,5	84,7
Czech Rep.	75,4	78,8	81,4	Poland	74,6	77,9	80,4
Denmark	77,3	80,3	82,5	Portugal	77,5	80,7	82,5
Estonia	71,3	76,5	79,2	Romania	71,4	75,7	78,6
Finland	78,3	81,7	84,0	Russia	64,8	70,8	74,1
France	79,5	83,3	85,5	Serbia	73,2	76,1	78,8
Germany	78,7	81,6	83,9	Slovakia	73,8	77,2	79,7
Greece	78,1	81,4	83,6	Slovenia	76,5	80,4	82,7
Hungary	72,4	76,2	79,0	Spain	79,8	83,0	85,0
Iceland	81,0	83,4	85,6	Sweden	80,1	82,8	84,7
Irleland	77,8	81,7	84,0	Switzerland	80,7	83,8	86,0
Italy	80,2	82,8	84,9	Ukraine	67,7	71,3	74,4
Latvia	70,8	75,5	78,5	Un. Kingdom	78,5	81,3	83,6

Source: Own elaboration based on World Population Prospects

Fig. 4 The changes of demographic ageing (differences in Wis) in the years:



Source: Own elaboration based on World Population Prospects

$$W_{WM} = \frac{L_{(+85)}}{L_{(50-64)}} \times C$$

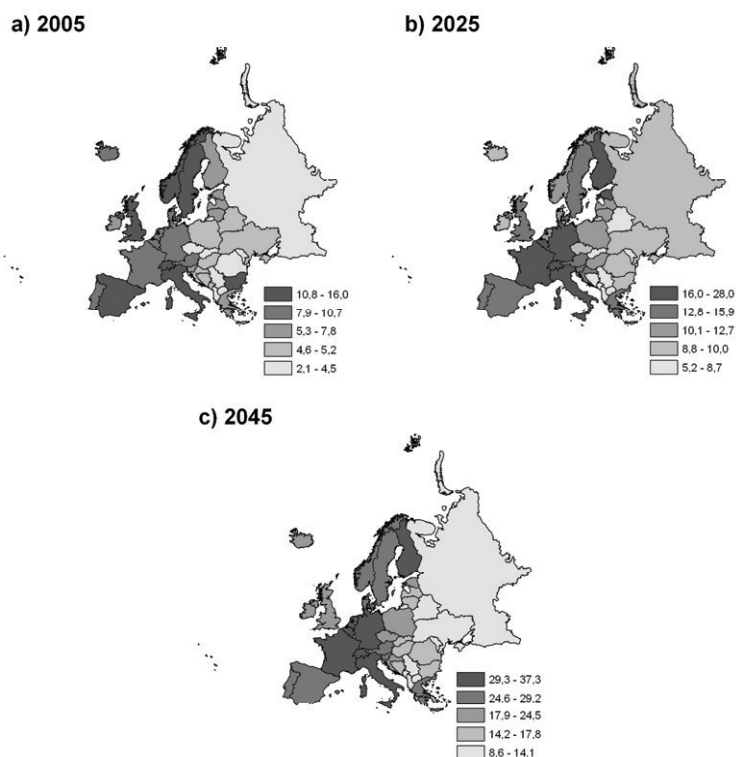
- $W_{MW}$  – parental support ratio
- $L_{(+85)}$  – population aged 85+
- $L_{(50-64)}$  – population aged 50-64
- $C$  – constans (=100)

An important measure of population aging is the intergenerational support index (a variation of the elderly dependency ratio) ( $I_{IS}$ ). The index is defined as the ratio of the number of people in the age group of 85 years and older and the number of people in the age group of 50-64 year olds. The latter group is the next generation of people who are „theoretical children of” the age group of people who are 85 or older. While in developed affluent countries with advanced social welfare and healthcare systems, the elderly will be provided for, it is very important for poorer countries with weaker social and medical care systems to know how large a group of „theoretical children” will have to (and will be able to) care for their „theoretical parents”. Under these circumstances, it seems that the elderly will have a better chance for a peaceful life in countries with better traditions of family life, where multigenerational families are part of everyday reality.

What are the perspectives then, when it comes to population aging in the future? One of the key factors will be life span. Let us remember that, thus far, only a relatively small portion of Europe’s population

(about 2%) consists of people who reach an age over 85. Let us consider this further. In 2005, the intergenerational support index for the whole continent equaled 8. That means that there were 8 elderly people per 100 people aged 50-64. While that was the case then, age structure forecasts now show that in 2025, this index will equal 13, and twenty years later, it will have grown to 23. These numbers are averages for all of Europe, therefore, they show only a general picture of this phenomenon. The intergenerational support index values, however, are significantly different for different regions in Europe. In 2005 (Fig. 5a), the highest index values were typical for Bulgaria (16.0), Sweden (12.6), and Italy (11.7), while Moldova (2.1) and Macedonia (2.7) had the lowest index values. Let us look at forecasts to put things in perspective. In 20 years (Fig. 5b), the highest index values will be characteristic for Estonia (28.0) and Cyprus (21.9), while the lowest index values will still be true for Moldova (5.2) and Slovakia (6.5). It is forecasted that in 2045 (Fig. 5c), the countries with the highest index values will be France (37.3) and Italy (35.9). In the same year, again, Moldova (8.6) and Belarus (11.4) will have the lowest index values. Comparing data gathered for the three selected years, separated by 20-year time intervals, it may be concluded that the intergenerational support index in the period 2005-2025 (Fig. 6a) will be increasing the most rapidly in Estonia, Cyprus, Finland, Croatia, and France, while in the period 2025-2045 (Fig. 6b), the same will hold true in France, Italy, the Netherlands, and Switzerland. The rate of increase (measured by the difference in index values) between the 20-year periods being compared will decrease only in a few countries (Estonia and Cyprus will experience the largest decrease), but in most countries this process will intensify. It will intensify in Bulgaria, Iceland, and the Netherlands, where the index increases will be the highest (Fig. 6c).

Fig. 5 The level of parent support ratio (Wwm) in the years:

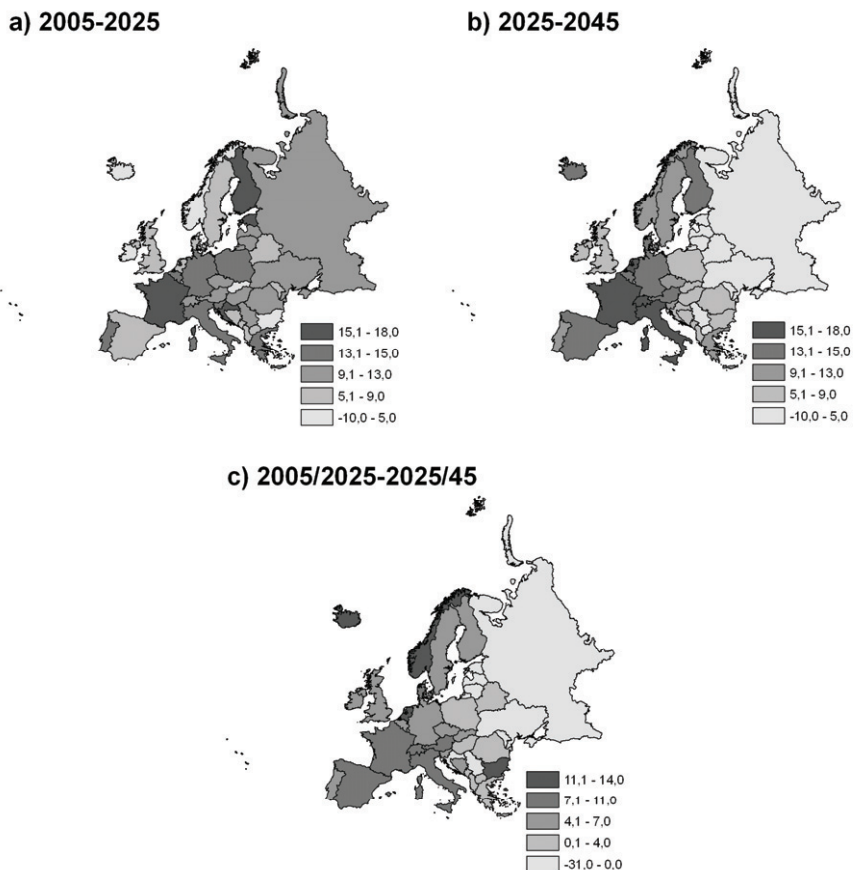


Source: Own elaboration based on World Population Prospects

Another index that will be changing for European countries in near future will be the potential support index ( $I_{PS}$ ). For the purpose of this research work, this index was defined as the ratio of the number of

individuals in the 20-64 age group (theoretically professionally active) and the number of individuals in the 65 and over group (theoretically retired). For the entire European continent, this index will be gradually decreasing. Its value was 4.2 in 2005. The index will decrease to 3.0 in 2025 and further decrease to 2.2 in 2045. This means that the group of people working to provide the means of support for the elderly will be growing increasingly smaller. Potential support index values in 2005 (Fig. 7a) were different for many different areas. The highest index values exceeded 6 (Albania) and the lowest did not fall below 3 (with the lowest being in Italy – 3.1). However, in 2025 (Fig. 7b), forecasted index values will range from 4.1 (Albania) to 2.3 (Finland, Germany), and in 2045 (Fig. 7c), from 2.8 (Albania) to 1.5 (Italy). In the period 2005-2025 (Fig. 8a), the greatest decrease will be recorded in Albania, Malta, and Slovakia, and the smallest in the Ukraine, Latvia, and Luxembourg. In the period 2025-2045 (Fig. 8b), the greatest index dynamics will be typical for Ireland (1.5 points of index value) and for Macedonia, Albania, Spain, and Iceland (1.3 pts. each), while the smallest index dynamics will be typical for Finland (0.3 pts.) and Sweden (0.4 pts.). This will mean that when index dynamics are compared for the two 20-year periods of interest, a decrease in index dynamics will be observed in most European countries – measured as a difference between index values for consecutive time periods. The decrease in index dynamics will be greatest in Malta, Finland, the Netherlands, and Poland. An increase in index dynamics will be noted by a small number of countries, with Belarus, Spain, and Luxembourg (Fig. 8c) being the best examples.

**Fig. 6 The changes in the level of parent support ratio (differences in Wwm) in the years:**



Source: Own elaboration based on World Population Prospects

Fig. 7 The level of potential support ratio (Wpw) in the years:

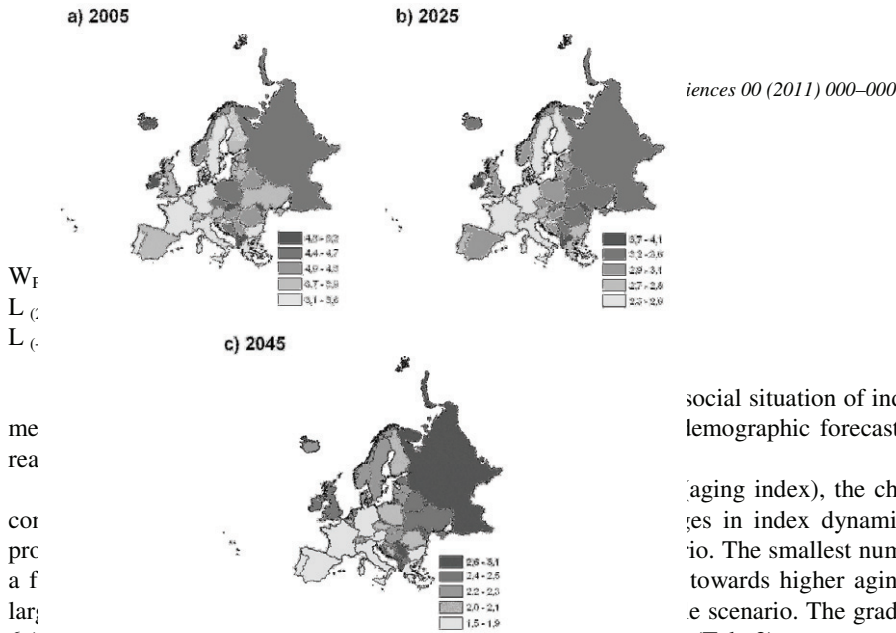


Fig. 8 The changes in the level of potential support ratio (differences in Wpw) in the years:

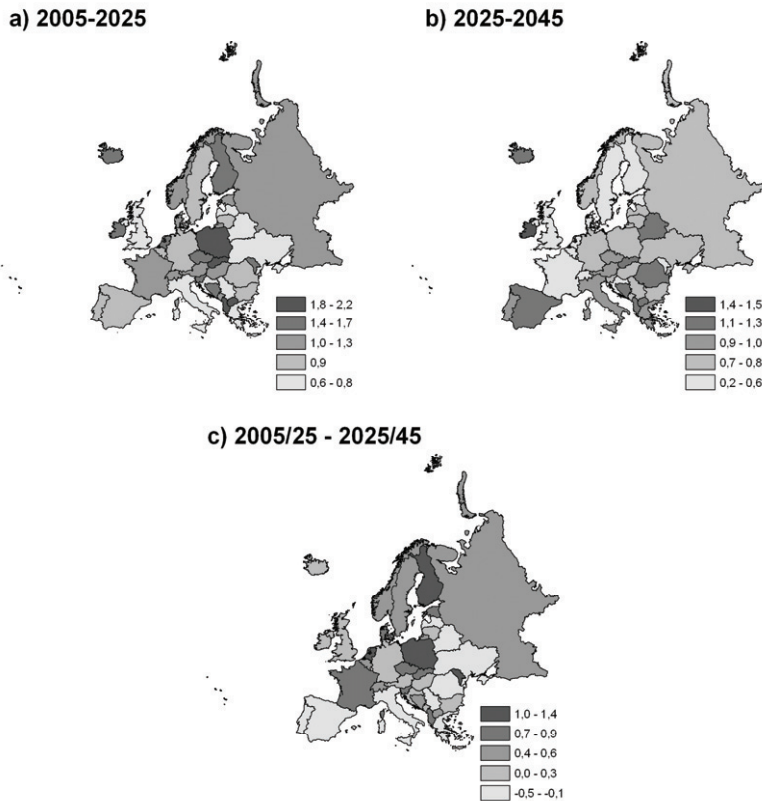




Table 2 The rank of countries according to the level and dynamics of ageing

Country	pts.	Country	pts.	Countryj	pts.	Country	pts.
Albania	22	Belgium	81	Malta	126	Poland	165
Cyprus	43	Estonia	81	Norway	128	Germany	172
Montenegro	53	Czech Rep.	83	Greece	130	Romania	180
Iceland	66	Lithuania	93	Bulgaria	132	Swden	190
Ireland	68	Moldova	101	Nietherlands	133	Ukraine	191
Denmark	71	Bosnia i Herz.	106	Spain	141	Switzerland	193
France	75	Latvia	107	United Kingdom	152	Italy	193
Macedonia	75	Croatia	108	Russia	156	Portugal	194
Belarus	79	Finland	108	Serbia	156	Slovenia	202
Luxemburg	80	Austria	125	Slovakia	158	Hungary	204

Source: Own elaboration based on World Population Prospects

### 3. Conclusion

It may be concluded that when it comes to the state of population aging as well as its dynamics in Europe, the most favorable scenario can be forecasted for Albania, Cyprus, Montenegro, Iceland, and Ireland. All five countries lie close to the perimeter of the European continent. Forecasts for countries such as Hungary, Slovenia, Portugal, and Italy are very pessimistic. Population forecasts for Poland also do not seem to be very optimistic. Both the magnitude of population aging parameters and the trends in their change indicate that the process of population aging is intensifying and that it is irreversible. That is why there is a need to find solutions in order to, if not reverse, then at least halt the observed unfavorable trends. A positive change in the birth rate might weaken the population aging process to some extent, or at least for a period of time. Solutions should be sought through pro-family policies. In terms of intergenerational support, the effects of population aging will largely depend on finding and applying system-based solutions. On the one hand, such solutions will help to preserve intergenerational bonds. On the other hand, they will create proper conditions for the handicapped to live active lives and for the seriously ill to live with dignity. In terms of the economic aspect of the problem, “replacement migration” is believed to be a solution that can secure a certain level of retirement benefits. Replacement migration would allow to maintain a steady ratio of the number of working people to the number of retirees. Therefore, in order to successfully mitigate the negative results of population aging – while the average life span is gradually increasing – real political solutions as well as a broad range of social, economic, and financial solutions will be necessary.

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