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The changes of the Population Structure and its Consequences in Selected EU Countries – Some Aspects

Andrzej Skibiński[1]

Abstract:
The analysis of the population structure allows to define many of socio - economic consequences. Demographic change (population ageing) in Europe is seen as a challenge for many policy areas: from family policy; through education, lifelong learning and labour market policy; to social protection systems, and pensions, health and long-term care in particular. Although the degree and speed of the population ageing in individual regions of Europe differ substantially, the consequences have an impact on the entire European Union. The article focuses on to the implications of the observed demographic trends for the labour market. Hence, the aim of this publication is to indicate the impact of demographic changes on the size of labour force in the selected UE countries. The quantitative and qualitative analyses were used herein and conducted based on data from Eurostat and the OECD Statistics statistical databases, taking into account demographic projections. Absolute Increases dynamics and indicators were the methods used for time series changes. The temporal scope of the analyses was largely determined by data accessibility.

Key words: labour force, labour market participation, demographic processes

1. Introduction

There is a view among numerous scientists that the present changes in the global economy and its problems are not easy to understand based on the classical economic knowledge alone. They think that at present the dominant role, especially in European Union countries, is played by demographic processes, such as increased migration and increasing process of population ageing resulting from, among other things, the fall in the birth-rate below the replacement threshold and longer life expectancy. Following the classics of the literature of the subject we can conclude that the ageing process appeared at a certain stage of development of the human population. These changes in age composition were predictable; however, their magnitude and speed may be surprising. In parallel to their advancement, different theories and ideas were formulated. Initially, negative views were in the majority. Concerns about economic and social progress were expressed especially in the 1950s. Notestein's idea that viewed as a whole, the problem of ageing is no problem at all. It is only the pessimistic way of looking at a great triumph of civilization' was one of the exceptions [Notestein, 1954]. Optimistic assessments became more frequent in the 1960s and the 1970s. They included that of Polish demographer E.

[1]Corresponding author: Czestochowa University of Technology. Faculty of Management, Poland.

Rosset, who indicated that the most rapid social and economic development was achieved by countries with a significant share of older people [Rosset, 1983].
The process of population ageing started first in Scandinavian and Western European countries, gradually covering countries in Southern Europe and Central Eastern Europe. Although currently we can observe convergences among these regions in this respect, the extent of the process of population ageing varies significantly by geographical area, which implicates numerous negative consequences, both economic and social ones. One of the most important economic consequences is undoubtedly shrinking and ageing of potential labour force[1]. In view of the above, the main aim of this publication is to present analyses of demographic structures by economic age groups in selected EU countries for certain periods taking into account demographic projections. The paper presents a research thesis that the changes observed in population age structure significantly impact the supply side of the labour market (supply of labour force) in a multifaceted way and with a changing dynamics in individual countries. Due to the broad scope of the research issues, the author of this publication decided to present only selected relationships.

2. Methodology of research

The quantitative and qualitative analyses applied herein were conducted using data from Eurostat and OECD Statistics databases, taking into account demographic projections. Methods of graph plotting points changes were used, such as absolute increases and dynamics indexes. The temporal scope of the analyses was to a large extent determined by data availability. The year 1970 was chosen as the beginning of the period of temporal comparisons. In order to illustrate the differences in the increasing process of population ageing, the following groups of EU countries were selected for the research, taking into account the geographical aspect: Western Europe - Germany, France, United Kingdom,
Central Europe - Poland, Czech Republic, Hungary,
Southern Europe - Italy, Spain, Greece
Scandinavia - Denmark, Sweden.
For each of the characteristics discussed, spatial comparisons were made, with a country as a comparison unit.

3. Theoretical background

The observed demographic trends have a significant impact on almost all spheres of the socio-economic life [Harper, 2016; Schmidt&Vosen, 2013; Siegel, 1980; Skibiński&Sipa 2015; Sipa et.al., 2016]. From the point of view of the dimensions of the process of population ageing, it is important, according to Chesnais, to consider two fundamental issues; the growing number of older people and changes in the age structure

[1] Labour force (labour supply). Working age population actively participating in the labour market. For the purpose of this analysis, the working age is from 15 to 64 (after Eurostat).

of the population [Chesnais, 1990]. The table 1 presents classifications of issues, to assist in understanding the consequences of demographic trends observed in the area of economics. Table 1. Expected consequences of an ageing population from the point of view of the economics and intergenerational relations.

Table 1. Expected consequences of an ageing population from the point of view of the economics.

Area	**Consequences of the growing number of older people**		**Consequences associated with changes in the age structure of the population**
Economics (the economy and the labour market)	- The growth of social stratification among seniors.		- Increased burden on the social security system - Shrinking labour resources. - **Ageing of the labour force (age management, lifelong learning).** - Slowdown of economic growth. - **Change in the structure of consumption changes in the structure of employment.** - Increase in social stratification.
	- Growth in economic activity and entrepreneurship of people of the pre-retirement and retirement age. - Development of new forms of professional activity,	- Increased burden on the state budget.	

Source: own study based on: Jaźwińska-Motylska et al. (2014). Społeczne konsekwencje starzenia się populacji ze szczególnym uwzględnieniem zmian relacji opiekuńczych. Ośrodek Badań nad Migracjami. Uniwersystet Warszawski. Studia i materiały No 3, p. 7

When analysing the consequences of European population ageing, it is important to look at the causes of this process. Apart from transformations connected with the changes in demographic structures by age, we should look for the causes in population reproduction transformations, especially fertility and mortality as part of the theory of demographic transition[2]. According to Lee & Reher prolonged decline in fertility leads to changes in population age structures. Initially these changes affect the base of the population pyramid, as the relative size of younger cohorts begins to decline. For some time, the initial decline at younger ages is not compensated by increases at older ages, and so by

[2] The demographic transition theory (DTM) is a generalised description of the changing pattern of mortality, fertility and growth rates as societies move from one demographic regime to another. The term was first coined by the American demographer Frank W. Notestein in the mid-twentieth century, but it has since been elaborated and expanded upon by many others. Demographic changes observed in the the selected EU countries are characteristic for fourth stage of demographic transition.(low fertility, low mortality, life expectancy is getting systematically longer).

implication the relative size of populations of working age tends to increase. This process continues as long as the size of birth cohorts continues to rise. This was the case in most of the forerunners of the demographic transition until some time between the late 1950s and the early 1980s when birth cohorts for the first time began to decrease in size. In most European Union countries the period of more youthful population age structures lasted for many decades, perhaps as long as a century. In the future, this will no longer be the case, as shrinking birth cohorts lead to shrinking populations of both working age and reproductive age in many countries. While it lasted, however, this window of opportunity had profound economic implications for society, as long as the economy was able to generate enough jobs to accommodate the growing population of working age [Lee & Reher, 2011].

Theories attempting to explain the causes of fertility changes include, among other things, the fertility decline theory by Caldwell, Easterlin's theory and hypothesis and the economic theory of human behaviour by G.S. Becker. Taking into account the impact of economic, cultural and institutional elements, J.C.Caldwell thinks that the direction and amount of intergenerational flow of wealth is an important factor that caused the decline in fertility in the period of demographic transition. Moreover, he distinguished two stages of the development of societies. In the first, there are no reasons for a family's reduction of its own fertility, while in the second, such reasons exist. Thus, both high and low fertility is justified, if it guarantees social and economic benefits to a family [Caldwell, 1980]. Meanwhile, Easterlin estimated a model in which the basic fertility determinants are demand, measured by a desirable size of a family, supply, which is expressed in the number of children that a family would have without using conscious birth control, and costs in terms of money, time and mental effort connected with using birth control measures. These basic determinants are influenced by modernisation processes, cultural and genetic factors as well as intervening variables [Macunovich, 1998]. G.S Becker stated in his concept that taking a rational procreation decision analogical to a decision about purchasing durable consumer goods is possible only at a certain stage of socio-economic development. This is because it necessitates separating a decision about birth control from a decision about spouses' sexual abstinence. This stage is determined by access to knowledge and birth control means. These phenomena are characteristic only of modern societies, with societies with the traditional type of reproduction condemned to high birth rate [Becker, 1993]. At this point it is necessary to mention the views of R. Lesthaeghe, who claims that differences in fertility levels among societies and dynamics of their changes are closely connected with differences in religious beliefs, secularisation, individualism and materialism. Moreover, the author states that economic prosperity creates a hierarchy of human needs, in which luxury goods are increasingly important. An important role in the process of population reproduction is also played by socio-political issues [Lesthaeghe, 1983]. According to [Kirk, 1996; Rączaszek, 2004], among others, the process of population reproduction strongly depends on periods of political changes, especially political breakthroughs. An example can be countries of Central Eastern Europe.

4. Analysis of demographic structure by age in selected countries of European Union

The process of population ageing can be examined in two aspects: as changes in population age structure as a result of comparing two selected time periods or as continuous changes (e.g. annual) in age structure showing their trend [Kurek, 2008]. Generally, the higher dynamics of the process, the bigger increase in the share of older people and that of young population.
However, for the demographic future in the countries analysed of importance is the pace of this process, as well as the process of transformations of population age structure, understood as changes in the proportions of the different age groups [Jóźwiak, 2013]. In view of the above, the starting point for appropriate analyses will be presentation of population pyramids by age and sex groups (fig. 1) in European Union countries, covering two periods, i.e. 1990-2015 and 2015-2080.

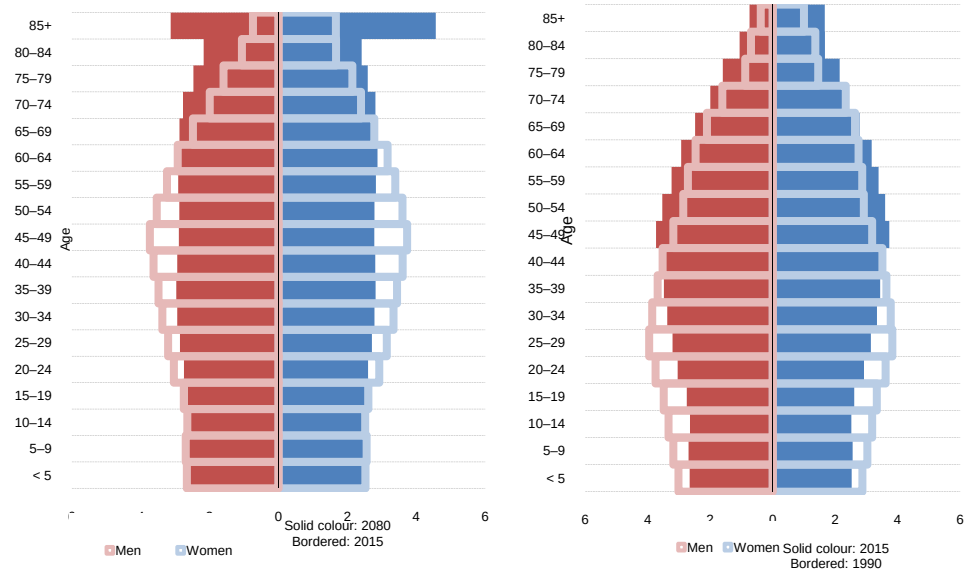

Fig 1. Population age structure by sex in European Union countries in periods 1990-2015, 2015-2080
Source: Eurostat EUROPOP 2015 data, http://ec.europa.eu/eurostat (access date 28.07.2016)

Figure 1 shows that the age structure of EU population will significantly change in the nearest decades. In 2015, cohorts of males and females aged 45-49 were most numerous. The percentage of population aged 0-14 will remain at a relatively similar level until 2080 and will account for around 15% of the total population. A significant decline is predicated in the share of population aged 15-64 (from 65.9 % in 2015 to 56.2% in 2080). There will be a significant increase in the share of people aged 65-79 (from 13.4% in 2015 to 16.4% in 2080). Moreover, people aged 80 and over will account for around 12.3% of total population in 2080 (increase by 7.% compared to 2015) [The ageing

report, 2015]. The above shows a clearly regressive character of the age structure of EU countries, which significantly differs from that in the period 1990-2015[3].
From the perspective of the labour market, it is important to analyse population structure by economic age groups taking into account the dynamics of changes in these age fractions in time[4]

Table 2. Change in population structure by economic age groups taking into account demographic projection until 2080.

Country	Years						**Dynamics index**	
	1970	**1990**	**2000**	**2015**	**2030**	**2080**	**2015/1970 1970-1,00**	**2080/2015 2015-1,00**
	Percentage of people at the pre-working age (0-14)							
EU 28	-	19.5	17.2	15.6	14.9	15.1	**0.80**	**0.96**
Czech Rep.	21.4	21.7	16.6	15,2	14.7	15.7	**0.71**	**1.03**
Denmark	23.4	17.1	18.4	17.0	16.8	16.0	**0.72**	**0.94**
France	24.9	20.1	19.1	18.6	17.7	16.8	**0.74**	**0.90**
Greece	24.2	19.5	14.7	14.5	12.3	14.1	**0.60**	**0.97**
Germany	23.3	16.0	19.7	13.2	13.0	13.3	**0.56**	**1.01**
Hungary	21.1	20.5	16.9	14.5	14.4	14.5	**0.68**	**1.00**
Italy	24.6	16.8	14.3	13.8	13.3	13.7	**0.56**	**0.99**
Poland	27.2	25.3	19.8	15.0	13.7	13.5	**0.55**	**0.90**
Spain	27.7	20.2	14.9	15.2	11.8	14.6	**0.54**	**0.96**
Sweden	20.9	17.8	18.5	17.3	18.1	16.6	**0.82**	**0.95**
United Kingdom	24.1	19.0	19.1	17.7	17.9	16.6	**0.73**	**0.93**
Percentage of people at the working age (15-64)								
EU 28	-	66.8	67.2	65.5	61.2	56.2	**0.98**	**0.85**
Czech Rep.	64.7	65.8	69.6	67.0	63.1	57.0	**1.03**	**0.85**
Denmark	64.6	67.3	66.8	64.4	60.9	57.1	**1.00**	**0.88**
France	62.3	66.0	65.1	63.1	59.2	56.8	**1.01**	**0.90**
Greece	64.7	66.8	68.0	64.8	62.1	54.8	**1.01**	**0.84**
Germany	63.2	69.1	64.1	65.7	59.3	54.3	**1.03**	**0.82**
Hungary	67.4	66.3	68.1	67.7	63.7	55.9	**1.01**	**0.82**
Italy	64.6	68.5	67.6	64.5	61.4	55.0	**0.99**	**0.85**
Poland	64.6	64.7	68.1	69.7	63.7	54.2	**1.07**	**0.77**
Spain	62.8	66.4	68.4	66.3	63.2	57.6	**1.05**	**0.87**
Sweden	65.6	64.4	64.2	63.1	60.5	57.7	**0.96**	**0.91**
United Kingdom	63.0	65.3	65.1	64.6	60.9	57.6	**1.02**	**0.89**
Percentage of people at the post-working age (65+)								
EU 28	-	13.7	15.6	18.9	23.9	28.7	**1.37**	**1.51**
Czech Rep.	11.9	12.5	13.8	17.8	22.2	27.3	**1.49**	**1.53**
Denmark	12.2	15.6	14.8	18.6	22.2	26.9	**1.52**	**1.44**
France	12.8	13.9	15.8	18.4	23.1	26.4	**1.43**	**1.43**
Greece	11.1	13.7	17.3	20.9	25.6	31.1	**1.88**	**1.48**

[3] The projections data is indicative only and designed to stimulate thinking about the causes of alarming trends and possible corrective measures to be taken.

[4] Structure of economic group: 0-14 pre –working, 15-64 working, 65+ post-working).

Germany	13.5	14.9	16.2	21.0	27.8	32.5	**1.55**	**1.54**
Hungary	11.5	13.2	15.0	17.9	21.9	29.6	**1.55**	**1.65**
Italy	10.8	14.7	18.1	21.7	25.1	31.3	**2.01**	**1.44**
Poland	8.2	10.0	12.1	15.4	22.6	32.3	**1.87**	**2.09**
Spain	9.5	13.4	16.7	19.5	25.0	27.8	**2.05**	**1.42**
Sweden	13.6	17.8	17.3	12.6	21.4	25.7	**0.93**	**2.03**
United Kingdom	12.9	15.7	15.8	17.7	21.2	25.8	**1.37**	**1.45**

Source: own calculation based on: Eurostat data and World Bank Data.

Analysis of the data contained in table 2 allows a few important detailed conclusions to be drawn. First, examination of population aged 0-14 in the period 1970-2015 shows a decline of the share of this population in all the countries analysed (with the biggest decline in Spain, Poland, Italy, Germany, and the smallest in Sweden, Denmark, France and Great Britain). Changes in the dynamics of the decline in the share of this fraction are connected, among other things, with the period when negative demographic tendencies in population reproduction began. Where this process began earlier, e.g. in Scandinavian and Western European countries, such as Sweden, Denmark, France or UK, the decline in the share of this population in the period analysed was smaller than in Central and Southern European countries, where negative demographic changes started later and were more rapid, especially in the "group of countries from the former eastern bloc, e.g. in Poland". It is worth stressing that in the face of increasing life expectancy of Europeans[5], and the birth rate remaining for several decades below generational renewal[6], we observe a decrease in the number of people starting professional activity, and as a consequence shrinking of potential labour force. Second, in the case of population aged 15-64, the dynamics of changes in the period 1970-2015 was not the same in the countries analysed. A decline in the share of this population was recorded in Italy and Sweden, and coincided with the European-wide trend. On the other hand, the biggest increase in the share of population at working age was recorded in the other countries analysed (the biggest in Poland, Spain and Czech Republic). The increase in the share of population aged 15-64, observed e.g. in Poland, was a result of the 1970s and early 1980s baby boomers entering this sub-population. This doesn't mean however that there is an upward trend. Quite the opposite. Based on the projections data we can expect a decline in the share of working age population in all the EU countries analysed, with the biggest decrease expected in Poland, Hungary and Germany. Third, looking at the period 1970-2015, we can conclude that almost all of the countries analysed (except for Sweden) recorded increasing population ageing. The biggest increase was in Spain, Italy, Greece and Poland, while the smallest one in UK, Czech Republic, Germany and Hungary. An increase in the share of population aged 65+ will be observed over the next several decades in all the countries analysed, but with varying intensity.

[5] The average life expectancy of population in EU28 is systematically growing, and is nowadays 83.6 years for females and 78.1 years for males. [Data for 2015. Eurostat, http://ec.europa.eu/eurostat]

[6] Total Fertility Rate in UE 28 countries is 1.57 on average, and for a dozen or so years has remained at the level that does not guarantee simple generational renewal. (TFR<2.1) means there is no generational renewal.) The values of these rates vary in the different countries, therefore we observe differentiation in the dynamics of demographic phenomena.

The increasing shrinking of labour force was also observed analysing old dependency ratio. This ratio is a relation of the number of people aged over 65 to the total number of working age people (15-64).

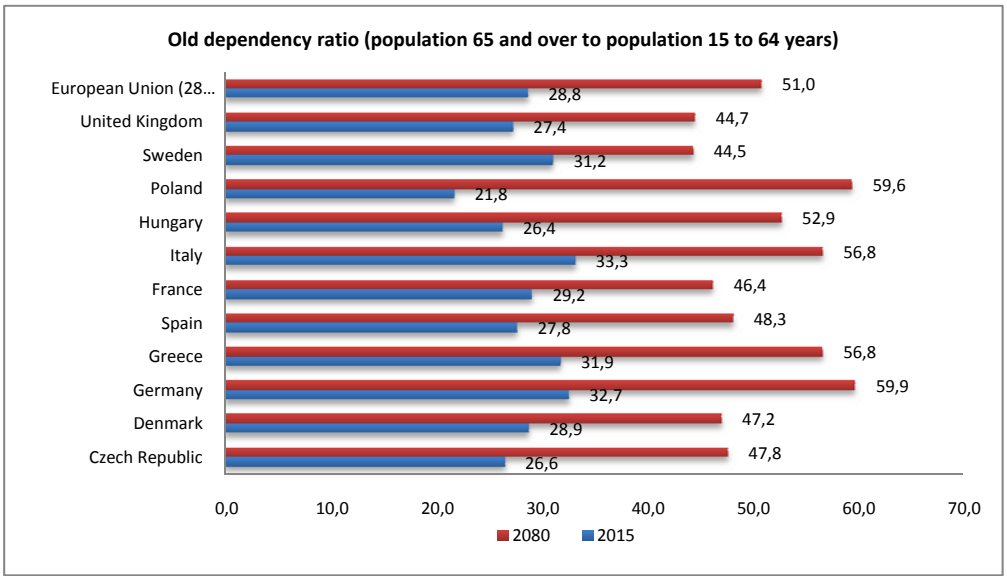

Fig. 2. Old dependency ratio in selected EU countries between 2015 and 2080 taking into account demographic projection [in%].
Source: Own study based on Eurostat data, http://ec.europa.eu/eurostat/data/database (access on: 27.07.2016)

By means of the old dependency ratio presented in fig. 2 it is possible to define the degree of imbalance in the proportion between working and post-working age groups and, indirectly, to show the size of the burden on working population connected with the necessity of distribution of generated GDP among the increasingly smaller working population and increasingly bigger population of those retired.
In 2005, the values of old dependency ratio were at a similar level. The highest value was recorded in Germany, Greece, Sweden, Italy and France, whereas the lowest one in Poland, Czech Republic and Hungary. Based on the demographic projection, we can expect an upward tendency in old dependency ratio in such countries as Poland, Germany, Italy and Greece. We can thus conclude that an increase in the advancement of demographic old age implicates a decrease in the fraction of potential labour force, where older age groups, which are successively moving to the post-working age group, are not replaced by younger age groups that start professional activity. In order to prevent and mitigate the effects of the observed demographic tendencies, most EU countries carried out appropriate retirement reforms which contributed, among other things, to extension of the period of labour market participation, especially in the 50+ age group, which seems to be confirmed by data in fig. 3.

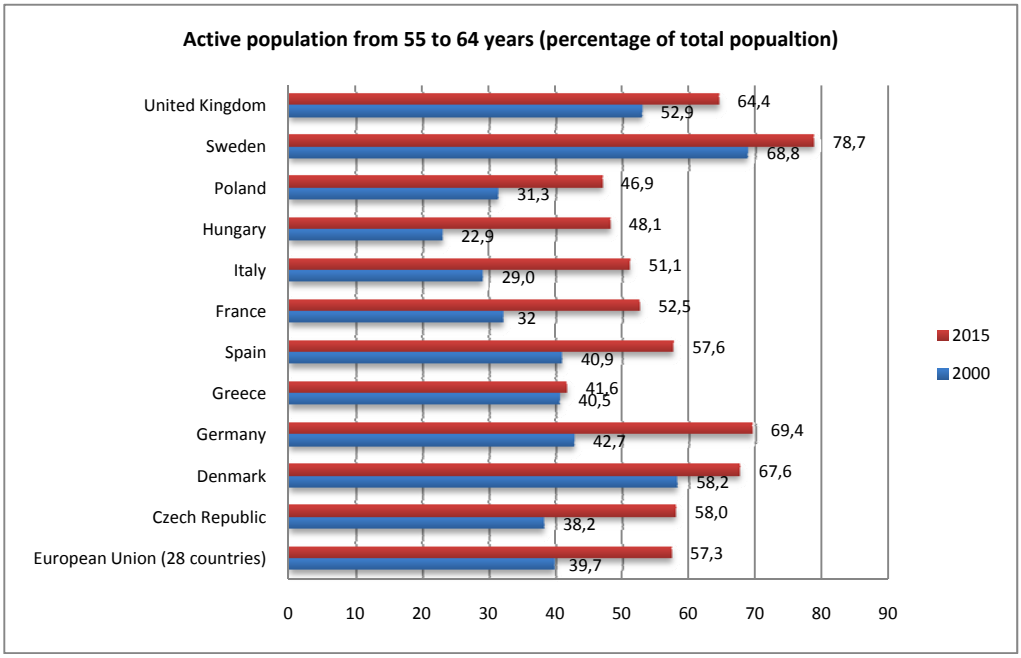

Fig.3. The labour market participation rate for the 55+ age group in selected EU countries between 2000 and 2015
Source: as above

The data presented in fig. 3 shows a clear increase in labour market participation among population aged 55-64 in all the EU countries analysed. This is very important from the perspective of ageing labour force. Between 2000 and 2015, the biggest increase was recorded in Germany, Hungary, France, Italy and Spain. The biggest labour market participation in this sub-population group was recorded in Scandinavian countries (Sweden, Denmark) and Western Europe (Germany, UK). The lowest values were recorded in Central European countries (Poland, Hungary). We can also see differences by sex. The lower labour market participation among females results, among other things, from retirement age, biological, economic, social and cultural factors, such as motherhood, childrearing, care for dependents, and higher domestic commitments compared to males [D'Addio et. al., 2010, Thompson, et al., 2014]. Causes of geographical differentiation in labour market participation in this group of population can be found, among other things, by analysing the duration of working life.

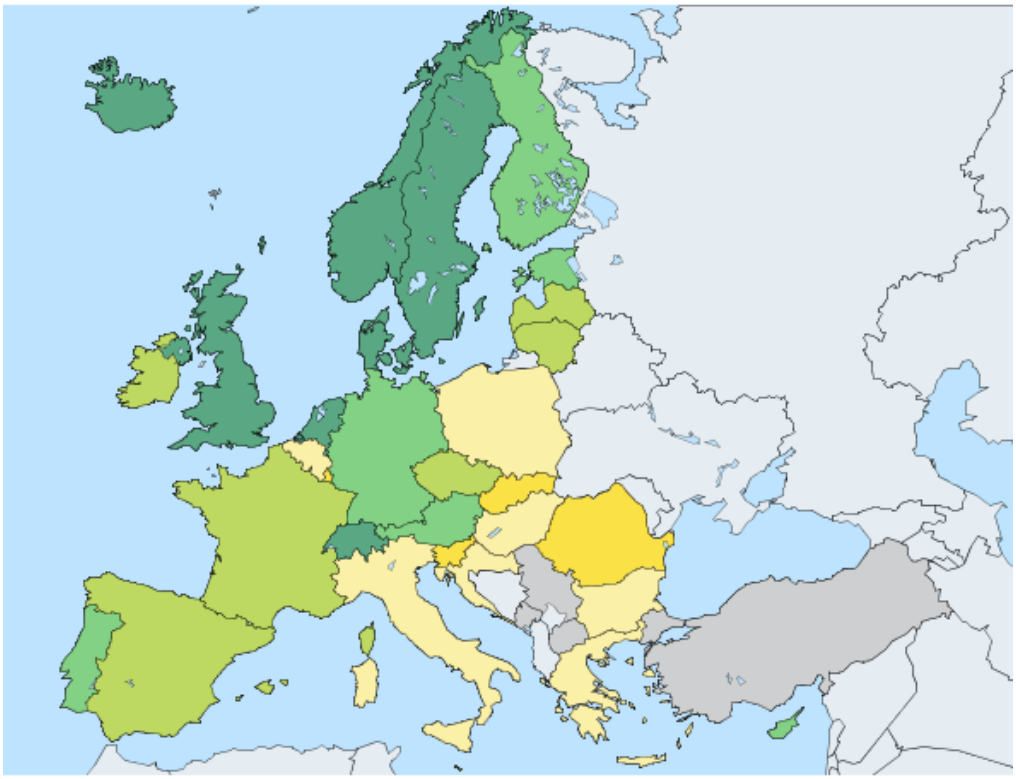

Fig. 4 Duration of working life (DWL)) in 2015
Source: as above

Fig. 4 shows that residents of Scandinavian and Western European countries have the longest prospect for working life, whereas those from Central Eastern European countries - the shortest one. It is worth stressing at this point that the tendency of decreasing labour market participation among people aged 55 and over has for many years been present in European countries with developed market economy causing concern due to an expected fall in the number of working age people, as well as increasing labour force and population ageing. After 1989, similar changes were observed in Central and Easterns European countries. Various activities, undertaken in the 1990s in increasing number of countries seeking ways to increase labour market participation among workers from older groups of working age reflect the importance attached by governments to the reversal of the tendency of earlier retirement [Kotowska, 2005; Kelley&Schmidt, 2001; Phellas, 2013]. Starting from the second half of the 1990s, activities to promote longer working life in EU countries were organised, among other

things, as part of active ageing policy[7] which envisages: increase in the ratio of older population employment, reversal of the tendency of earlier retirement, development of medical and social research to support healthy ageing and develop new health-promoting tools, and counteracting social discrimination and exclusion. [The active ageing raport, 2012].

Conclusion

Analysis of quantitative and qualitative data showed that changes in population structure by age, manifested in increasing population ageing, have a multifaceted impact on EU countries, affecting various spheres of socio-economic life. Particular influence of the observed demographic tendencies is visible in the labour market, as shrinking of potential labour force is a cause of concern in almost all EU countries.

Analysis of old dependency ratio revealed the process of labour force ageing. Despite clear convergences in this area between the countries analysed, we can observe differences in intensity and dynamics of this process, which is a result, among other things, of the period of initiation of negative demographic tendencies in population reproduction in the different groups of countries.

The analyses presented in this publication also showed that in the context of unfavourable demographic tendencies, the period 2000-2015 saw an increase in labour market participation in the 55-64 age groups, especially in Central and Southern European countries, which indicates greater awareness of the consequences of the process of population ageing, and the strategies developed at the EU level are conducive to an increase in labour market participation and employment and to longer working life, especially as regards workers in the above-mentioned sub-population.

Summing up, it can be concluded that population ageing is an inevitable process, and addressing it requires and will require taking immediate and long-term systemic activities, including activation initiatives on the labour market (especially for older people) to mitigate the effects of the decreasing share of potential labour force in the age structure of population.

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[7] Active ageing is the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age. The Active Ageing Index has been developed to assess the untapped potential of older people. The European Innovation Partnership for Active and Health Ageing is fostering innovation to raise healthy life expectancy.The Social Protection Committee is looking at ways of making adequate provision of long-term care sustainable in ageing societies, by investing in prevention, rehabilitation, age-friendly environments and more ways of delivering care that are better adjusted to people's needs and remaining capacities. More information [The active ageing raport EU].

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