ELŻBIETA SOJKA

UNIVERSITY OF ECONOMICS, POLAND

PROCESS OF AGEING OF ŚLĄSKIE VOIVODSHIP POPULATION UNTIL 2035

ABSTRACT. The article presents changes in the structure of population by age in Śląskie voivodship between 1990 and 2035. The similarity of structures has been studied with the use of taxonomic algorithm and the time distributions of senility and load indices of the population in general while taking sex and place of residence into consideration have been presented. The process of population ageing is more and more intensive. Less and less numerous age groups that reach the productive age and more and more numerous age groups that enter the retirement age show that Śląskie voivodship, similarly to the whole area of Poland and other European countries, will have to face the problem of population ageing. This challenge is particularly hard to confront because of the low level of professional activity of the people over 50 years of age.

KEY WORDS: Poland, Śląskie voivodship, population structure, population ageing, age pyramid, index of demographic load, structural similarity measure.

INTRODUCTION

Demographic changes in Śląskie voivodship after 1989 – similarly to the whole country – were characterized by a rapid decrease in demographic dynamics, that had mainly resulted from the decrease in the number of births, which reflected violently decreasing women's fertility and the number of children they had during their reproductive age. At the same time a significant improvement in mortality rate characteristics which brought distinct extension of expected lifespan was observed. Those changes influenced the population structure by age and, as a consequence, also the relations between three economic groups. The share of people at the pre-productive age decreased and the share of old age group of people increased in the total population. This caused intensification of the process

of population ageing. Population ageing brings various consequences including deterioration of the health state, increase in the number of old aged people and the growth in the number of disabled people. Anticipated increase in the number of old aged people means larger state budget burden because of higher maintenance costs of elderly people (increase in the burden of systems of social insurance, old-age pension and disability payment, social welfare and increase in medical services) (Szymańska et al., 2009). Following the ageing of society the decrease in work resources and their ageing will proceed, which will have a significantly unfavourable consequences for the job marketplace.

The article presents changes in the structure of the population by age in Śląskie voivodship between 1990 and 2035. Similarity of structures with the use of taxonomic algorithm has been studied and distributions of senility and load indices have been presented while taking into consideration sex and place of residence.

We searched for the answers to the following fundamental investigative questions: (A) Is there a tendency to lower the degree of similarity in the age structures? (B) How has the process of changes in functional age groups of the population been proceeding? (C) What is the dynamics and degree of progression of population ageing process between 1990 and 2035? (D) How are the observed changes in the population ageing process situated in the context of comparisons between the voivodships? GUS (Central Statistical Office) statistical data on the structure of population by sex, age and place of residence and recent population forecast for the years between 2008 to 2035 have been used in the study (1).

CHANGES IN POPULATION AGE PYRAMID

The most important changes in the structures of population between 1990 and 2035 will be characterized by means of age pyramids, measure of similarity of structures and indices that define the share of population by the functional age groups (pre-productive, productive and post-productive) that are fundamental from the point of view of the job market. Fig. 1 to 3 present age pyramids for selected years from the studied time interval (as for the state of 31st December).

Two demographic explosions ('bulges') are clearly distinguished in the structure of the population. The first one is the explosion of the post-war period (baby boom), the representatives of which will reach the post-productive age in the next few years, and the other is an echo of the post-war explosion, that is, the people born at the turn of the 1970s and 1980s of the 20th century. The most distinct gap in the pyramid of the 1990 refers to the age group of 20 to 24 years of age. These are age groups born during the first post-war depression between
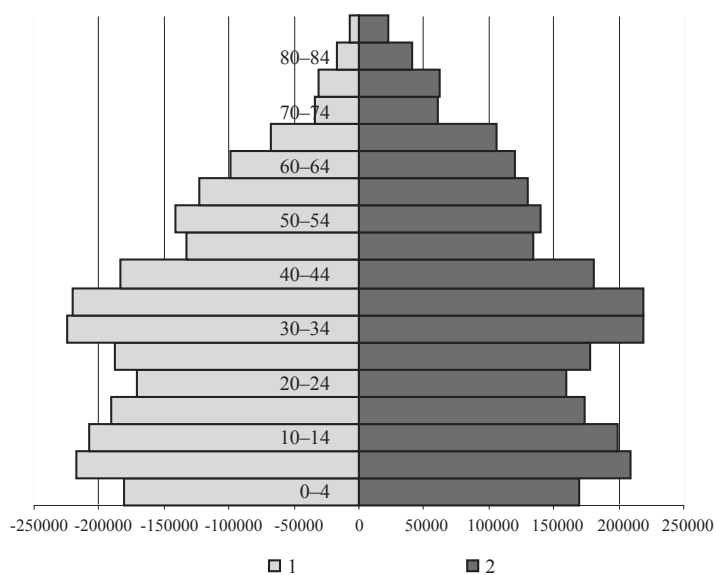
Fig. 1. Population by sex and age in Śląskie voivodship in 1990
Explanation: 1 – men; 2 – women
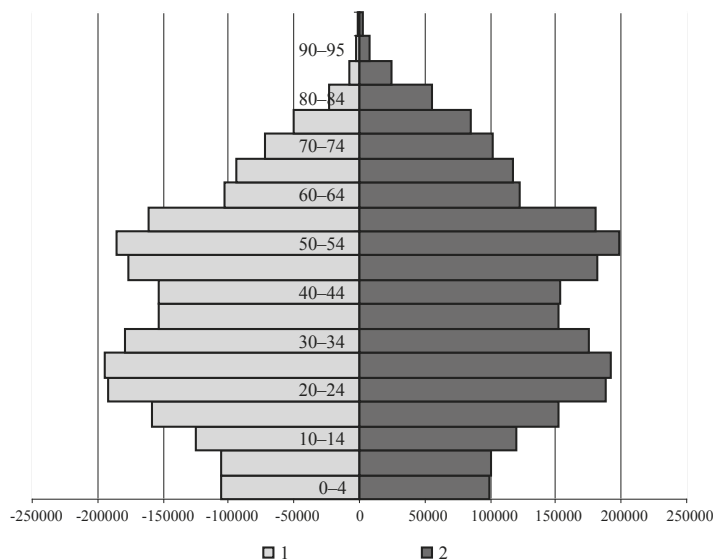
Source: Own study

Fig. 2. Population by sex and age in Śląskie voivodship in 2007
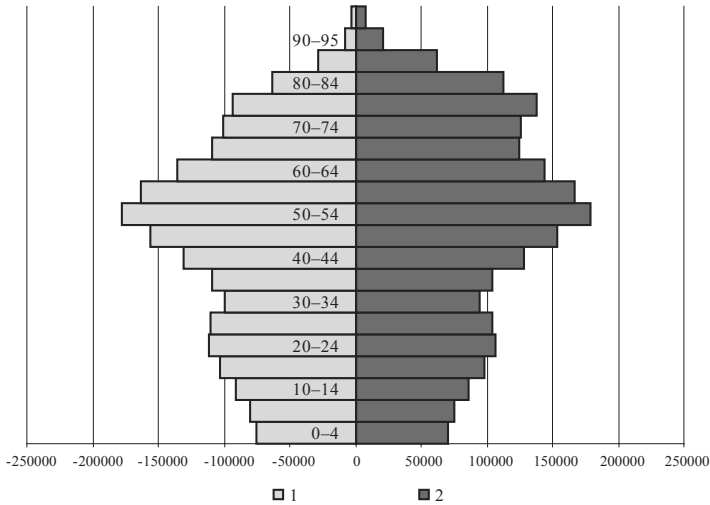Explanation: 1 – men; 2 – women

Source: Own study

Fig. 3. Population by sex and age in Śląskie voivodship in 2035
Explanation: 1 – men; 2 – women

Source: Own study

the years of 1966 to 1970. The age pyramid of 2007 (which forms the basis for the prognostic calculation) has a narrow base, which is a result of birth rate depression in the last decade of the 20th century.

In the pyramid for 2035 we can observe regularities that were discussed before but shifted up by 28 years. Deferred births of the population explosion from 1976 to 1984 will contribute to the growth of having children by women in the first years of the next decade (about 2012). After this period the decrease in the number of births is expected, which is proved by the basis of the pyramid in 2035 (2).

Changes in natural activity and in the actual growth of the Śląskie voivodship population between 1990 and 2035 are presented in Fig. 4 and 5.

Undoubtedly, with the flow of time the Śląskie voivodship population structure is going to be more and more similar to regressive pyramid, the pyramid that is typical of population that is growing old.

The assessment of similarity in population structures can be performed by means of the method of structure taxonomy (Chomątowski, Sokołowski, 1978: 217). It is a taxonomic algorithm that allows to perform a division of studied objects (structures) into uniform groups, at a given critical level of similarity α (that corresponds to the critical distance from the method of Wrocław taxonomy) specified freely on the level from the range of (0.1). The principle that
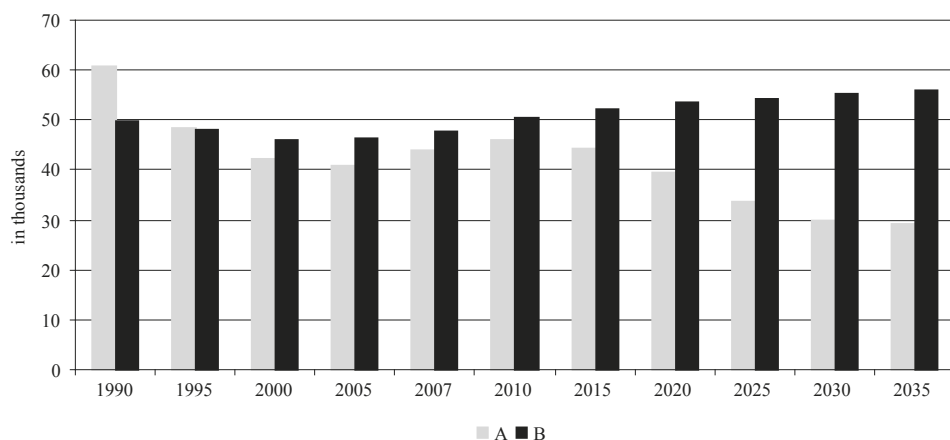
Fig. 4. Births and deaths in Śląskie voivodship between 1990 and 2007 and the forecast until 2035
Explanation: A – births; B – deaths
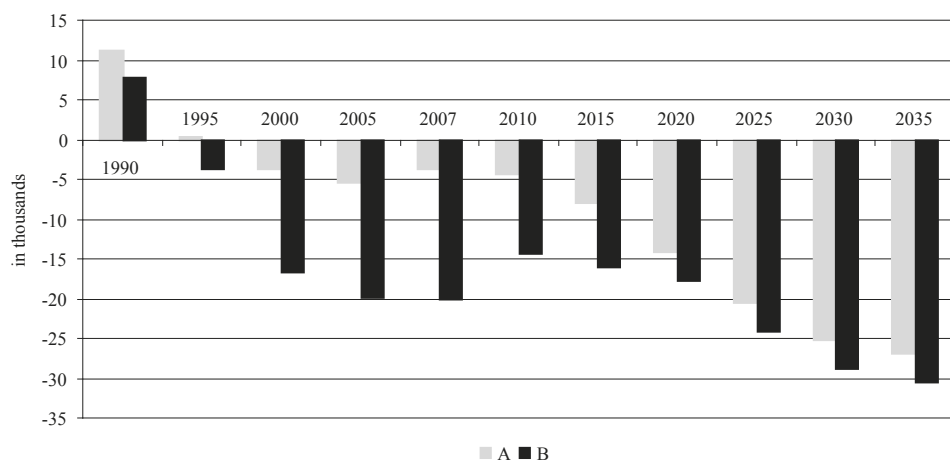
Source: Own study

Fig. 5. Birth rate and actual growth of Śląskie voivodship population between 1990 and 2007 and the forecast until 2035
Explanation: A – birth rate; B – actual growth

Source: Own study

only the elements of the structures of which are similar in pairs is accepted as the criterion for division. Similarity is defined for pairs of structures by means of the similarity measure:

$$P_{ij}^* = \sum_{k=1}^{r} min\ (p_{ik,}\ p_{jk})$$

i, j – object numbers,
k – the number of the structure component,
p_{ik} – k share of this component in the i object structure,
p_{jk} – k share of this component in j object structure.

Similarity measure of structures is included in the range of (0.1). If the structures are completely different, then $P_{ij}^* = 0$, and if they are identical then $P_{ij}^* = 1$. Table 1 presents similarity measures of age structures for selected years from the studied period of time with the structures of 1990 and of 2007.

Table 1. Measures of similarity in age structures in Śląskie voivodship in selected years and the structures from 1990 and 2007

Year	1990	1995	2000	2005	2007	2010	2015	2020	2025	2030	2035
1990	1.000	0.933	0.886	0.861	0.852	0.849	0.852	0.824	0.788	0.760	0.763
2007	0.852	0.870	0.915	0.975	1.000	0.958	0.905	0.875	0.866	0.871	0.858

Source: Own calculations

The values of measure indicate low similarity of age structures compared with the structure of 1990. What is more, there is a constant tendency to decrease this similarity. The reasons of this phenomenon may include instability of the birth intensity, changes in the order of mortality rate as well as migrations. A similar tendency can be observed in the case of the value of the similarity measure in future structures compared with the structure of 2007. The results of conducted analyses allow to give a positive answer to the first question presented at the beginning.

Then, adopting a critical level of similarity α = 0.1 (3), a division of age structures in particular years into uniform groups was performed, that is: Group 1 – 1990, 1995; Group 2 – 2000, 2005, 2007; Group 3 – 2010, 2015; Group 4 – 2020; Group 5 – 2025, 2030; Group 6 – 2035.

From the point of view of the needs of the job marketplace analysis it is important to study the changes in structures according to groups of the pre-productive, productive and post-productive age that are called functional ones (4). Changes in the number and structure of the population according to the functional age groups are presented in Table 2 and Fig. 6.

Table 2. Population of Śląskie voivodship by functional age groups between 1990 and 2035

Years	a	From the total:			
		b	c	d	e
1990	4,957.2	1,407.2	2,981.8	568.2	1,201.5
1995	4,907.9	1,291.6	2,999.7	616.6	1,238.7
2000	4,758.9	1,086.3	3,007.4	665.2	1,346.6
2005	4,685.8	885.2	3,063.0	737.6	1,528.0
2007	4,654.1	835.7	3,051.6	766.8	1,596.6
2010	4,611.9	789.4	3,010.4	812.1	1,676.2
2015	4,534.6	765.1	2,841.7	927.8	1,731.0
2020	4,447.1	763.5	2,639.9	1,043.7	1,752.5
2025	4,338.2	738.1	2,490.9	1,109.2	1,799.9
2030	4,202.1	667.8	2,406.7	1,127.6	1,879.1
2035	4,052.3	595.9	2,313.5	1,142.9	1,964.0
A	−18.3	−57.7	−22.4	+101.1	+63.5
B	−12.9	−28.7	−24.2	+49.0	+23.0

Explanation: A – change 2035–1990 in %; B – change 2035–2007 in %; a – total; b – 0–17 years; c – 18–59/64 years; d – 60+/65+ years; e – 50 years and more

Source: Own study on the grounds of WUS in Katowice (Statistical Office of the Voivodship), Prognoza ludności na lata 2008–2035, http://www.stat.gov.pl/
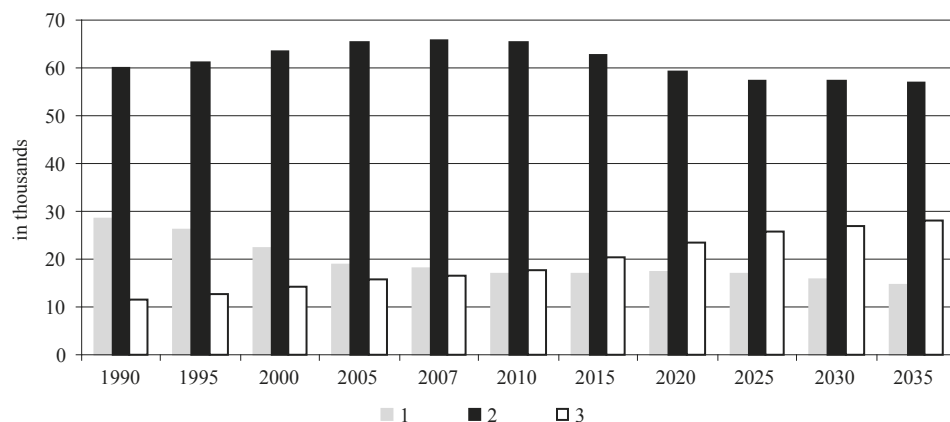

Fig. 6. Śląskie voivodship population by functional age groups between 1990 and 2035
Explanation: 1 – 0–17 years; 2 – 18–59/64 years; 3 – 60+/65+ years

Source: Own study

The analysis of data in Table 2 lets us formulate important observations. The number of population in Śląskie voivodship is going to decrease during the period between 1990–2035 by 18.3% (904.9 thousand people), while in the period between 2007–2035 by nearly 13%. The decrease in the number of people will involve two functional age groups: the community of people at the pre-productive and productive age. However, the number of people at the post-productive age is going to increase significantly; a more than double increase in 2035 against 1990 and by 49% against 2007. Starting from 2010 the number of population at the post-productive age is going to be higher that the number of people between 0 and 17 years of age.

The number of people who are 50 years old and over is growing systematically. During the period between 1990 and 2007, the number grew by a third, and according to the forecast, in 2035 it is to grow by almost a fourth if compared with 2007. If in the first years of the 1990s every fourth inhabitant of the voivodship was 50 years old or over, then in 2035 it is the case with every second.

Also, the share of people who are over 60/65 years of age and older has been undergoing regular changes (Fig. 6) from 11.5% in 1990 to 16.5% in 2007 and 28.2% in 2035. The above observations as well as a more detailed analysis of changes in the structure of population during the years between 1990 and 2007 prove a progressive ageing of population, visibly more intensive in the subpopulation of women. The period between 1990 and 2007 was characterized by intensive changes both on the top of the pyramid and at the basis of the age pyramid, while the decrease in the share of the people who are between 0 and 17 years of age was faster (by 10.4%), than the increase in the share of elderly people (by 5%). The process of ageing of the Śląskie voivodship population is going to be continued in the future. The growth in ageing intensity from 2015, which is a result of entering the group of elderly people by those who belong to the post-war population boom, can be particularly clear. It is going to be characterized by changes at the base and at the top of age pyramid, but as contrasted to the period between 1990 and 2007, definitely more intensive in the oldest age group. During the period between 2007 and 2035 the growth in the share of elderly people is going to be faster (by 11.7%) than the decrease in the share of the youngest population (3.3%).

On the other hand, the share of the post-productive age population in the total number of people was growing from 60.2% in 1990 to 65.5% in 2007. Yet, from 2010, a systematic decrease in this share up to 57.1% is expected in 2035 (decrease by 8.4%).

POPULATION AGEING

In the first stage of the analysis the index of demographic senility, defined as the share of people who are over 65 years of age in the whole studied population and the indices of load of the population at the post-productive age (18–59/64 years of age) with the people at the pre-productive age (0 to 17 years of age) and the post-productive age (60/65 years of age), was applied to assess the process of population ageing.

Table 3 additionally shows the changes in the number of people who are 65 years old and over, in time.

Table 3. Population of subjects who are 65 years of age and over by sex and place of residence during the years between 1990 and 2035

Years	A			B		
	a	b	c	a	b	c
1990	448,753	156,649	292,104	*	*	*
2000	548,136	205,117	343,019	122.1	130.9	117.4
2010	657,588	255,017	402,571	120.0	124.3	117.4
2020	866,492	345,829	520,663	131.8	135.6	129.3
2030	997,703	403,264	594,439	115.1	116.6	114.2
2035	999,416	405,898	593,518	100.2	100.7	99.8
Years	C					
1990	343,393	117,466	225,927	*	*	*
2000	421,955	156,962	264,993	122.9	133.6	117.3
2010	517,045	199,668	317,377	122.5	127.2	119.8
2020	690,429	272,178	418,251	133.5	136.3	131.8
2030	777,633	308,258	469,375	112.6	113.3	112.2
2035	767,617	305,729	461,888	98.7	99.2	98.4
Years	D					
1990	105,360	39,183	66,177	*	*	*
2000	126,181	48,155	78,026	119.8	122.9	117.9
2010	140,543	55,349	85,194	111.4	114.9	109.2
2020	176,063	73,651	102,412	125.3	133.1	120.2
2030	220,070	95,006	125,064	125.0	129.0	122.1
2035	231,799	100,169	131,630	105.3	105.4	105.3

Explanation: A – Śląskie voivodship; B – indices of dynamics (previous year in the table = 100); C – city; D – village; a – total; b – men; c – women

Source: Own study

The highest increase in the number of elderly people was observed in the 1990s in total populations, and for the cities. In the decade between 1990 and 2000, the number of elderly men was growing faster than the number of elderly women (by 30.9% and 17.4% respectively), which can be associated with, among others, the improvement in the characteristics of mortality in the subpopulation of men. As a consequence, the share of men in the population of elderly people grew from 34.9% in 1990 to 37.4% in 2000. The population forecast shows that the increase in the number of men who are over 65 years of age, that is faster than in the number of women at this age is anticipated. In 2035 the number of men is going to be higher by 62.5% than in the forecast starting year, that is in 2007, and the number of women – by 50.4% (5). The post-war demographic boom is going to be reflected during the years between 2010 and 2020 in extremely high growth regardless of the sex and place of residence. However, a higher increase in the number of elderly men ought to be expected in urban areas (increase by 36.3%) than in the rural areas (increase by 33.1%). The process of ageing is going to be significantly impeded in the period between 2030 and 2035 (the number of elderly men is going to be higher only by 0.7% and in case of women it is going to decrease by 0.2%). However, between 2020 and 2030 an increase in the number of elderly people in rural areas is going to be higher than in urban areas. It might be related to the process of suburbanization, that is, moving of households (families) to suburban areas around large industrial and shopping centres. Suburbanization processes started in Poland, and also in Śląskie voivodship at the end of the 1990s. Between the years of 1990 and 2007, the share of migration from cities to the country in the area of Śląskie voivodship grew by 13.5% (Sojka, 2007: 119). According to presumptions adopted in the forecast for the years between 2008 and 2035, these processes are going to be continued in the next few years (6).

In order to assess the progress of the population ageing process the indices of demographic ageing, in which the values result from the intensity of changes in the number of elderly people and changes in the number of the whole population were applied, and their graphic illustration is presented in Fig. 7.

The share of seniors who are 65 years of age or over increased between 1990 and 2007 by 4.7%, reaching as high as 13.8% of the total population. Therefore in the future an increased rate of the process of population ageing should be expected. In 2035 every fourth voivodship inhabitant is going to be 65+. The process of population ageing is of a dual characteristics, which means that within the group of elderly people the number of the oldest group of people is growing the fastest.

If we separate the people who are 80 years of age and over from the group of seniors, it appears that this group is going to grow extremely fast. As a result
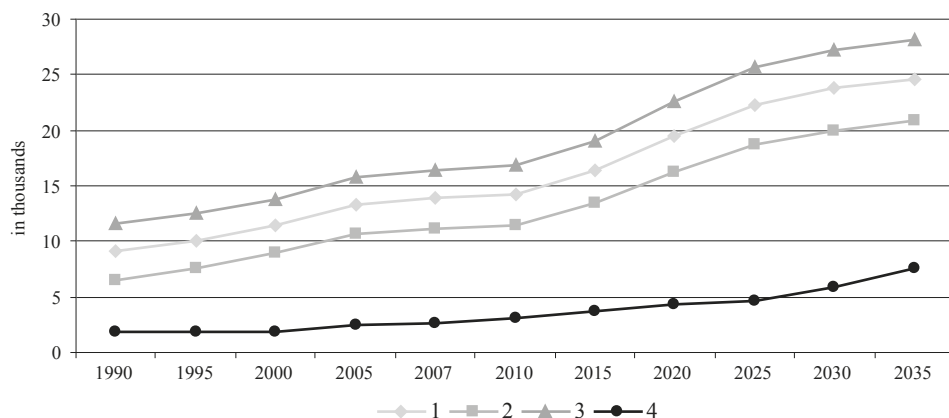
Fig. 7. Indices of demographic ageing by sex in Śląskie voivodship during the period between 1990–2007 and the forecast for the years 2010–2035
Explanation: 1 – total 65+; 2 – men 65+; 3 – women 65+; 4 – total 80+

Source: Own study

in 2035, every 13th voivodship inhabitant is going to belong to the so-called 'fourth-age group'. Analyzing the expected changes in the process of population ageing we should study the changes in economic load coefficients, that present the relationship between economic age groups in a synthetic way (cf. Table 4 and Fig. 8).

Table 4. Economic load coefficients by place of residence during the years from 1990 to 2035

| Years | Economic load coefficients (in%) * | | | | | |
| | A | | B | | C | |
	W_1	W_2	W_1	W_2	W_1	W_2
1990	47	19	46	18	51	24
1995	43	21	42	20	48	24
2000	35	22	34	21	42	25
2005	29	24	29	22	29	26
2007	27	25	26	25	32	25
2010	26	27	25	27	29	26
2015	27	33	27	34	28	29
2020	29	40	29	41	28	34
2025	30	45	30	46	29	40
2030	28	47	28	48	27	44
2035	26	49	26	50	25	48

Explanation: A – Śląskie voivodship; B – City; C – Village; *$W_1 = L_{0-17}/L_{18-59/64}$, $W_2 = L_{60/65+}/L_{18-59/64}$
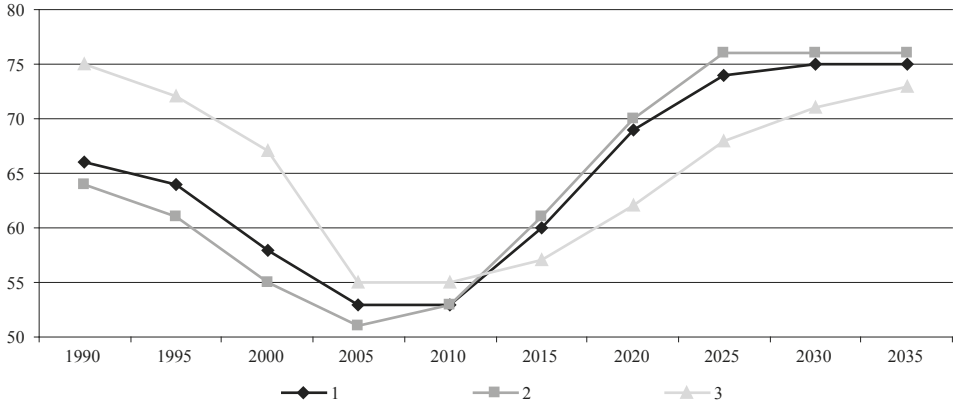
Source: Own calculations

Fig. 8. Total economic load coefficient (Wc = W$_1$ + W$_2$) by place of residence during the period between 1990 and 2035
Explanation: 1 – total; B – city; C – village

Source: Own study

During the period between 1990 and 2005 there was a decrease in total load coefficient in general from 66 to 53 people at 0–17 years of age and 60/65 and over, for 100 people at 18–59/64 years of age. This decrease was mainly caused by the fall in the value of load coefficient by people at the pre-productive age. Urban and rural populations are characterized by a similar tendency of changes, while in the case of the latter, the fall was significantly higher (from 75 in 1990 to 55 in 2005). Also in this period, the load of population at the productive age with elderly people was higher in villages than in cities. Regardless of the residence place in 2005 there was one person at 60/65+ years of age for every 4 people at the productive age. Starting from 2010 in the cities, and from 2015 in villages, the increase in the value of total load coefficient should be expected respectively, up to the level of 76 in the city, and 73 in the village in 2035, which will be caused mainly by the growth in the load coefficient by the people at 60/65 years of age and over. There is going to be a difficult situation in the cities of the voivodship. From 2020 at least 70 people in the non-productive age is going to fall for 100 people in the productive age. In fact, the actual load is going to be even higher because there are also people who cannot work because of various reasons in the group of people at the productive age. Not only economic changes are behind the process of ageing but also challenges of health and social nature (change in the structure of consumption, increase in the demand for services in the sphere of health care and social care, growth in expenditures to maintain the growing number of post-productive population). This is going to require many

actions from the state in the sphere of adaptation of infrastructure and financial resources to various fields of social and economic life.

To make the assessment of the level of advancement of the ageing process of Śląskie voivodship population complete, the senility measure suggested by M. Cieślak (Cieślak, 2004: 9) was additionally applied. Senility measure based on mean age and the index of asymmetry is represented by the following formula:

$$S_i = M_i \, (-A_i + 2)$$

S_i – the senility measure in i of this population,
M_i – i mean age in this population,
A_i – asymmetry index in i of this population (7).

Senility measure equals the mean age if the value of asymmetry index equals one and then the population has the youngest age structure. As the age structure is ageing, the senility measure is a multiple of the mean age (cf. Table 5).

Table 5. Characteristics of the ageing process of Śląskie voivodship population between the years 1990 to 2035

Year	A	B	C	D
1990	33.9	0.322	56.90	9.1
2000	37.1	0.223	65.93	11.5
2007	39.1	0.138	72.00	13.8
2010	40.5	0.090	77.35	14.3
2020	42.9	−0.125	91.16	19.5
2035	46.3	−0.135	98.85	24.7

Explanation: A – age mean, B – asymmetry index; C – senility measure; D – percentage of people at 65+ years

Source: Own calculations

Since 1990 general regularities have been lying in the growth in the value of mean age and the decrease in the strength of right-sided asymmetry until the year of 2017 inclusive, when the distribution of age is almost symmetric (A_{2017} = 0.005; $M_{2017} = 41.7$; $S_{2017} = 83.16$). These results are the effects of changes in the process of economical population reproduction (decrease in fertility and the number of children born to a woman, decrease in mortality). Starting from 2018, the asymmetry index assumes adverse values and as the years pass the power of asymmetry is growing. The appearance of asymmetric left-sided age distribution in the future would mean, as M. Cieślak writes, that 'the population abandons the attempts that aim at maintaining their number'.

Graphic illustration of age distribution of the population in the years of 1990, 2017 and 2035 is presented in Fig. 9–11.
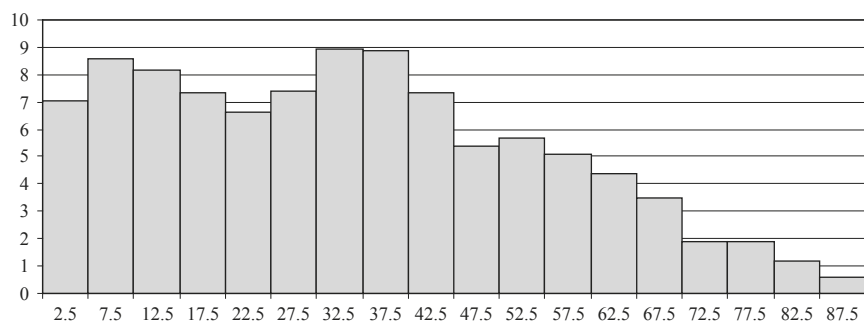
Fig. 9. Age distribution of Śląskie voivodship population in 1990
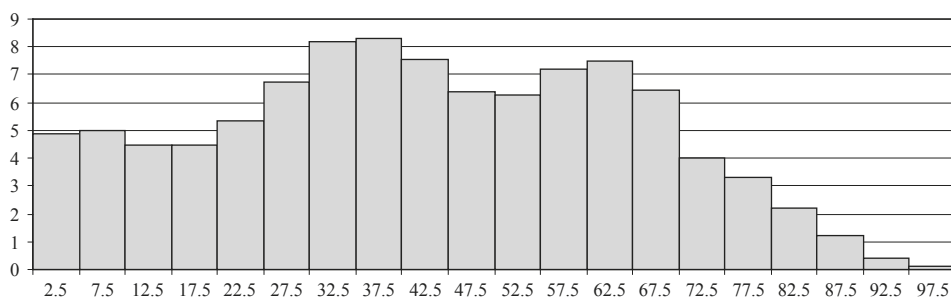
Source: Own study

Fig. 10. Age distribution of Śląskie voivodship population in 2017
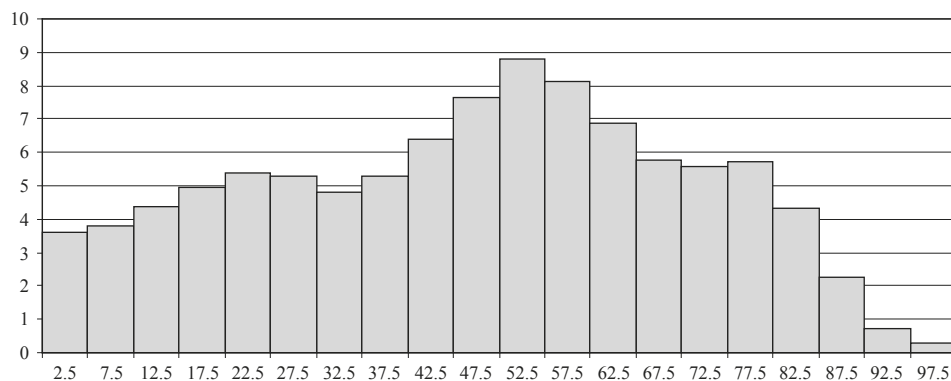
Source: Own study

Fig. 11. Age distribution of Śląskie voivodship population in 2035

Source: Own study

ŚLĄSKIE VOIVODSHIP AGAINST THE COUNTRY

Voivodships of Poland show quite a significant diversity with regard to the process of population ageing. In 2007 two voivodships, that is Łódzkie and Śląskie had the highest middle age – 39.7 and 38.8 years of age respectively. Podkarpackie and Warmińsko-Mazurskie were the youngest voivodships with the mean age not higher than 35.5 years. It ought to be remembered that in Łódzkie voivodship the mean lifespan of men was the shortest in Poland and in 2007 it was 68.7 years of age. It is over four years shorter than in Podkarpackie voivodship, that for many years has been the leader as for the lifespan. In the case of women, lifespan diversity is less significant. The female inhabitants of Łódzkie voivodship live the shortest – for 78.7 years and of Śląskie voivodship – for 78.8 years while the female inhabitants of Podkarpacke voivodship live for 80.9 years. It should be mentioned that Warmińsko-Mazurskie voivodship belongs to the group of voivodships with the highest number of children born to a woman (8).

According to GUS (Central Statistical Office) during the period between 2007 and 2035, the median of population age is going to grow in the range from 9 to 12 years suitably to the voivodship. The largest increase in the mean age is going to appear in Podkarpackie voivodship and the smallest in Łódzkie and Mazowieckie voivodships. In four voivodships the average age of their inhabitants is going to be higher than 49 years of age in 2035, including Śląskie voivodship, and half of inhabitants of Świętokrzyskie voivodship is going to be at least 50 years of age. According to expectations, in the majority of voivodships the process of population ageing is going to proceed. The share of elderly people (65+) shall reach the level of 25% in four voivodships: Świętokrzyskie, Opolskie, Śląskie, and Łódzkie. Between the years of 2007 and 2035 the smallest increase in the percentage of people at 65 years of age and over shall be observed in Mazowieckie and Małopolskie voivodships (9). They are the voivodships that are characterized by a positive balance of internal migration for permanent residence. Considering the fact that the migration is selective because of age – young people, at matrimonial age, migrate more often, which corresponds to higher fertility and the number of children born to one woman and also a smaller share of elderly people in total population number in the areas of inflow.

Assessing the position of Śląskie voivodship against other voivodships of Poland it should be stated that the voivodship is going to be characterized by relatively higher level of demographic senility.

Elżbieta Sojka

SUMMARY

Transformations of the process of population reproduction during the last few years of the 20th century, that were taking place together with the processes of modernization, influenced the changes in the population age structure during the period between 1990 and 2007 and they are also going to be unfavourably reflected on future structures of population by age in Śląskie voivodship and also in the whole country. In 2035, mean age is going to reach the level of 49 years of age (16 years more than in 1990 and 10 years more than in 2007), and in its composition, the population of Śląskie voivodship is going to comprise almost ¼ of elderly people (at the age of 65 and over). The process of ageing is going to encompass both women and men, although it is going to be significantly slower among the latter group which shall make the difference even deeper with regard to sex. In Śląskie voivodship (just like in the whole country) a group of people who are at least 85 years of age is going to appear. Their number was growing from 30.4 thousand in 1990 to 46.3 thousand in 2007 and is still going to grow fast up to 72 thousand in 2015 until 2025 when it is going to reach 97.2 thousand, which means doubling the number since 2007. The share of those people in the whole population is going to grow from 1% in 2007 to 1.6% in 2015 and 2.3% in 2025 until it reaches 3.2% in 2035. Therefore the demand for services related to care about elderly people is going to increase considerably. This problem is mainly going to refer to women. In 2015, feminization coefficient in the group of 85 and over is going to reach 262 and in the group of 90 years of age and over it is going to reach 338.

It appears from prognostic data that demographic marketplace infrastructure in the voivodship is going to shrink systematically, while the largest decline is going to appear between 2011 and 2020. First of all demographic potential of younger work resources is going to decrease (particularly in the decade between 2020 to 2030), which brings specific consequences. On the one hand the pressure to employ new labour force is going to decrease and on the other, we can observe the increase in the group of people at the non-mobile age that is characterized by low spatial and professional mobility and that responds to impulses of the job marketplace very weakly, which, as a consequence can intensify emphasis on enterprises of a social and protective character towards those elderly work resources. These expected but unfavourable relationships of changes in both sub-groups of the productive age can cause work deficiency in economy and encourage active immigration policy.

NOTES

(1) The status of population by sex, age and voivodships as for the day of 31st December 2007 provided the grounds for calculations. The forecast was prepared separately for each individual voivodship and the results were summed up for the whole country. The increase in the value of the coefficient of the number of children a woman had according to tendencies observed during the years between 2004–2007 was assumed, and gradual convergence of differentiations between voivodships registered in the starting year was adopted. On the level of Śląskie voivodship, these values are going to increase from 1.24 to 1.44 in cities and up to 1.36 in the country. The increase in the average lifespan from 70.7 to 76.9 years of age was assumed with reference to men and from 78.8 to 82.2 years of age for women. The forecast of internal migrations for Śląskie voivodship takes into consideration the existing distribution of population inflow and outflow. Finally, in the forecast, the growth in the number of internal migrations until 2012 and then their gradual decrease are anticipated. In case of migrations abroad for permanent residence adverse balance that is decreasing in time has been assumed (cf. Prognoza ludności na lata 2008–2035).

(2) During the period of time included in the study, the number of population in Śląskie voivodship is going to decrease by around 600,000 people. Considering the fact that the number of deaths is going to be higher than the number of births, we should expect an adverse birth rate while after 2015 natural decrease in population is going to be higher and higher (in 2010 – 4.4 thousand people, in 2020 – 14.2 thousand, in 2035 – 26.8 thousand people).

(3) Adoption of various levels gives various divisions. The smaller the α value, the sharper the division, that is, the bigger number of groups and the more numerous individual points, that is, one-element groups.

(4) The pre-productive age group includes population at 0–17 years of age, productive at 18–59 years of age (women) and 18–64 (men), post-productive: 60 years of age and over (women) and 65 years of age and over (men).

(5) The number of men at 65+ years of age is going to be over 2.5 times higher in 2035 than in 1990, and in case of women we should expect a double increase.

(6) In cities an adverse balance of internal migrations is anticipated because of the outflow of people from big cities to suburban areas near the cities. In villages, positive balance has been assumed.

(7) Standardized Charlie index from the list of asymmetry indices after the analysis of their properties has been used.

(8) In 2007 the coefficient of theoretical number of children for every woman in this voivodship was 1.398, while in Silesia region – 1.211. However, the lowest number of children for every woman was characteristic of the women residing in Opolskie voivodship – 1.042, and the highest in Pomorskie voivodship – 1.455. In Podkarpackie and Warmińsko-Mazurskie voivodships a gradual growth in the coefficient of the number of children for every woman is expected in the whole predicted period.

(9) In these voivodships the increase in the number of people during the years 2007–2035 is expected respectively by 5.4% and 1.5%.

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CORRESPONDENCE TO:

Elżbieta Sojka
University of Economics in Katowice
Department of Statistical-Mathematical Methods in Economics
Bogucicka 14, 40–226 Katowice, Poland
[e-mail: elzbieta.sojka@ae.katowice.pl]