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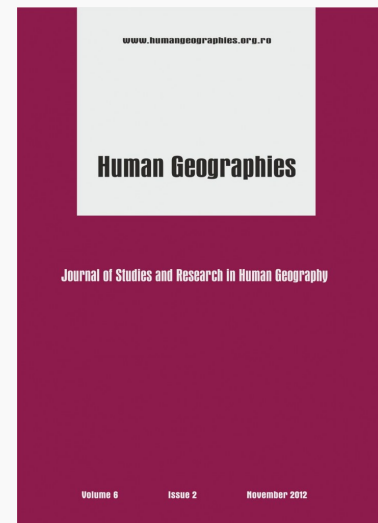
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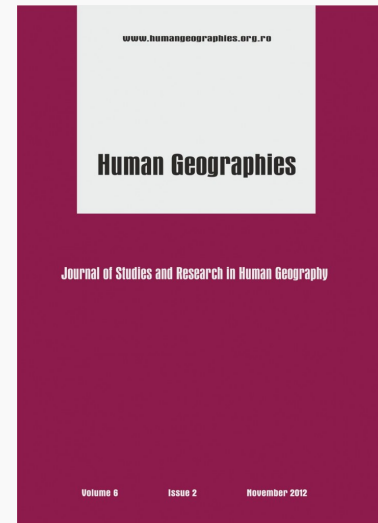
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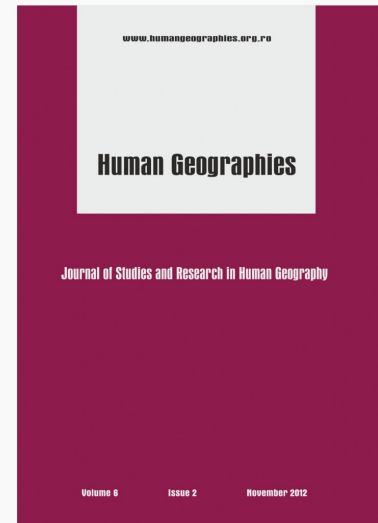
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ASPECTS OF THE PHENOMENON OF DEMOGRAPHIC POPULATION AGING IN CZECHIA AND SLOVAKIA: TIME AND REGIONAL DIMENSIONS

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Abstract: Over the past decades, the ageing of our society has become a widespread phenomenon. A continuing increase of the elderly population is particularly present in more developed regions of world. However, demographic changes are soon expected in less developed regions as a consequence of socio-economic development. The paper reports on the development of characteristics of the burden carried by the productive population as the consequence of the demographic ageing of population in the conditions of Slovak and Czech regions. Population was divided into the age groups and burden on the productive population was analysed using burden coefficients, age index and coefficients describing the dynamics of burden changes, specifically the inflow, outflow and substitution coefficient. The significance of this analysis is based on the fact that ageing influences – to the great extent – the spatial structure of human activities.

Key words: Ageing, Population, Slovakia, Czechia, Productive population, Ageing index.

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Introduction

The aim of study was to comparing the demographic ageing in Czech and Slovak districts, to define the clusters of districts with a similar ageing development, and to determinate position of units with high level of ageing in the state level.

In the past years the demographic reproduction in Czechia and Slovakia has not been developing positively, as far as the number of the population or their age structure are concerned (Vošta & Minařík, 2007: pp. 1-5). The demographic behavior of the population is consistent with to the development in the developed Western democracies. The phenomenon has brought about both negative and positive effects, which are related to the faster economic growth and the corresponding social development (Dufek, 2001: pp. 19-25).

According to (Mašková, 1993: pp. 236-246), the process of ageing when the growth of the youngest generation slowed down has been replaced by the lower death-rate in the old age groups of people which, consequently, has caused the longer lifespan

of population.

It is necessary to pay a special attention to the demographic development analyses as they bring the information of the principle for the further economic development and prosperity of the given territory (Malečková & al., 2009: pp. 77-86; Šídlo & Tesárková, 2009: pp. 87-100; Tesárková & Šídlo, 2009: pp. 101-114).

In Slovakia as well as Czechia the changes in demographic behavior are visible most significantly in reproductive behavior, which is characterized by the sudden decline of the natural population growth and of the reproduction rates to levels that do not provide for the self-reproduction of the population (Mládek & Káčerová, 2008: pp. 179-197).

Several aging indicators were evaluated in Slovak and Czech districts at first separately; subsequently the indicators were summarized in an aggregated one. For the aggregation, as a basis, a point method was used when for each indicator a districts is found, in which the relevant indicator reaches the maximum value (if the indicator value growth is a progressive phenomenon) or the minimum value (if the indicator value decrease is desirable). The selected indicators of this country have the value of 1 000 points. Then, other countries are scored from 0 to 1 000 according to how many pro miles their value amounts to of the maximum value. In the case that the base is the

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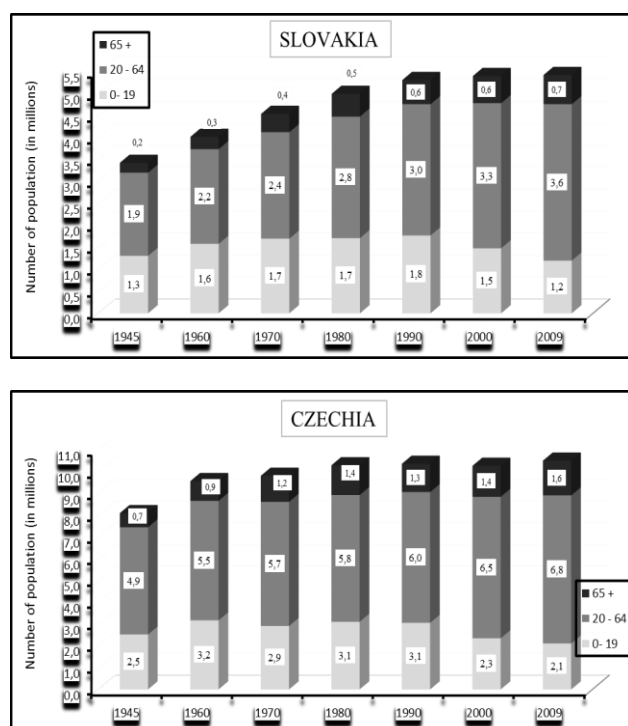
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minimum value of the indicator, a reversal value of this ratio is made. Then, the sum of points characterizes the districts level from the given viewpoint and enables to form and order, respectively groups of countries with a similar development (Jílek & el., 2001: pp.)

Temporal population aging

During the last 50 years in Slovakia the population in pre-productive age (0 – 19 years) as well as also the percentage of pre-productive population dropped from the 38.2 % in 1945 (1.3 million inhabitants) to 22.1 % (1.2 million inhabitants) in 2009, however in Czechia in same period decreased only from the values 31.1 % (2.5 million inhabitants) to 20.1 % (2.1 million inhabitants) (Figures 1,2).



Figures 1,2. Development of main age categories in Slovakia and Czechia (1945-2009)

Source: Statistical Office of Slovakia and Statistical Office of Czechia, 2011.

In the period between the World Wars was for countries typical the going down of the birth rate, deepened by the World Economic Recession, which was in the Slovakia more distinct. After the Second World War good economic conditions had a stimulating effect on entering a marriage as well as a positive effect on birth rate and the increase number of population in pre-productive age. The period of industrialization, which began in Slovakia at the end of sixties in 20th century (in Czechia one decade early), reflected on the reduction of birth rate and

stabilization of young population in Czechia and Slovakia. Both in Czechia and Slovakia during the 70-ties decreased of birth rate have been gradual by conditioned shift of the strong after-war age groups to the reproductive age.

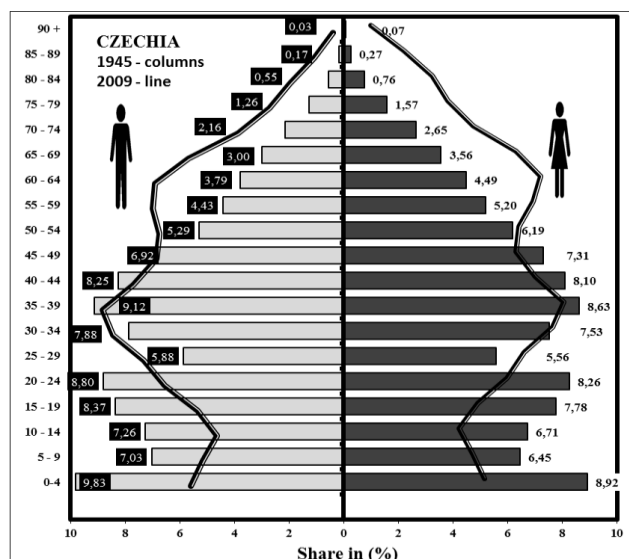
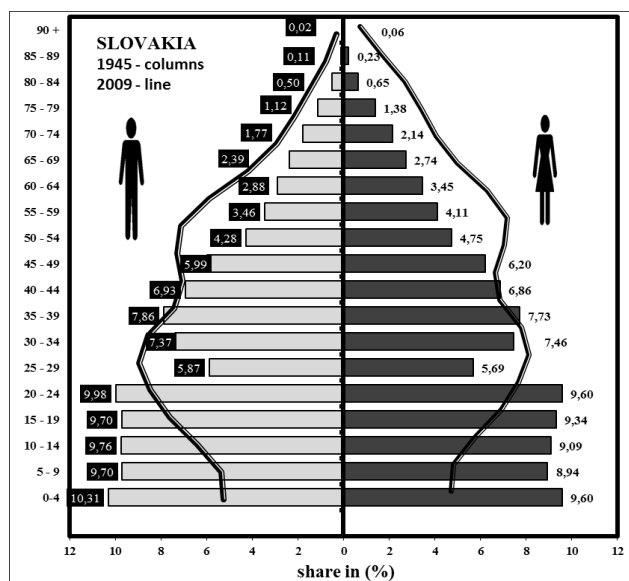
Regional differences of share population in pre-productive age across the Slovak and Czech districts are quite different. The lowest share of young people in Czech districts were observed in Capital city of Prague (17.1 %), Plzeň-city (17.7 %) and Brno-city (17.9 %) as well as in Slovak districts Bratislava V (14.8 %), Bratislava I (15.3 %) and Bratislava III (17.2 %). Mentioned districts are predominantly urban administrative units with the distinct character of a city center, regions with typically residential, service and industrial character. These cities suffer from negative natural movement of population as well as high level of elderly inhabitants.

The percentage of persons aged 65 years or over in Slovakia is nearly doubled in 2009 compare with 1945. The speed of ageing has been similar in both observed states, but there are some differences. In Czechia percentage of old population (65 years and over) increased from 8.0 % (in 1945) to 15.2 % (in 2009), while in Slovakia the percentage of persons aged 65+ increased slower only from 6.6 % to 12.3 % between 1945 and 2009. The highest proportion of elderly people (aged 65 and more) in 2009 have been observed in Bratislava I (19.1 %), Bratislava III (17.2 %) and Medzilaborce (16.8 %), for Slovak districts and Brno-city (27.1 %), Pelhřimov (26.8 %), Písek (26.7 %), for Czech districts. It is results of long-term lowest fertility patterns and favorable survival conditions in older age. On the contrary, the lowest percentage of aged 65 + and over may result either from the combination of better survival combined with higher fertility figures (like districts in North and East part of Slovakia).

When we talk about elderly population we have to realize some differences, which are made between mentioned groups of people. Divisions are sometimes made between the young-old (65-74), old-old (75-84) and the oldest-old groups (85 and over). However, problematic in this is that chronological age does not correlation perfectly with functional age, i. e. two people may be of the same age, but differ in their mental and physical conditions.

Another notable observation in the aging world is that aging population has itself been aging: the "oldest-old" (people aged 85 and over) are now the fastest growing portion of the total population in many countries, including those in the European region (Gavrilov & Heuveline, 2003: pp. 32-37) We noted that all old age categories between 1945 and 2009 increased rapidly (in Czechia and Slovakia). For example, percentage of age category the oldest old in Czechia has oscillated in time from 0.3 % in 1945 to

1.4 % in 2009. In the territory, the share of group oldest-old is different from one district to another, the highest values being in Brno-city (1.8 %) and Capital city of Prague (1.8 %). Similar situation was in Slovakia, when percentage of the oldest-old persons increased its values from 0.2 % (1945) to 1.1 % (2009). Response to new challenges with aging population, which are consequences of demographic changes in age structure of the inhabitants, must have a unified approach because all processes analyzed so far have an impact on all social systems, the political, economic, cultural, etc.



Figures 3,4. Age structure pyramids of Slovakia and Czechia (in 1945, 2009) and selected districts (in 2009)

Source: Statistical Office of Slovakia and Statistical Office of Czechia, 2011.

Population aging in Czechia and Slovakia is affected by their past historical events, which are best observed in the form of a demographic pyramid. Figures 3,4 demonstrate comparison of age structure

pyramids of Czechia and Slovakia in 1945 and 2009 as well as for the youngest and oldest districts according to mentioned states in 2009. As we can see, presented pyramids demonstrate their transformation from progressive in 1945 to regressive type in 2009. Small birth cohorts born during the war period consequently produced a fall in the number of births during the 1960s. Later these small birth cohorts and economic transformation of society contributed to the decline in the number of births observed during the 1990s.

The synthetic measures of population ageing

The ageing index has been triple since 1945 in Czechia. Over the last 65 years, the ratio of people aged 65 or over to persons younger than 20 increased in Czechia from 26 per hundred in 1945 to 76 per hundred in 2009. The same trends were observed in Slovakia, when in 1945 there were only 17 people 65 years or older for every hundred young persons under 20. Over the next 65 years, this ratio became almost three times larger. In this case, the lowest value of ageing index was observed in Slovak district – Námestovo (22.9 %), which was more than doubly lesser value of ageing index of Prague-west (52.1 %), the district with lowest ageing index in Czechia (2009). The ageing index is significantly higher in the more urbanized and developed regions of Czechia and Slovakia, but will grow faster in the less developed and rural districts.

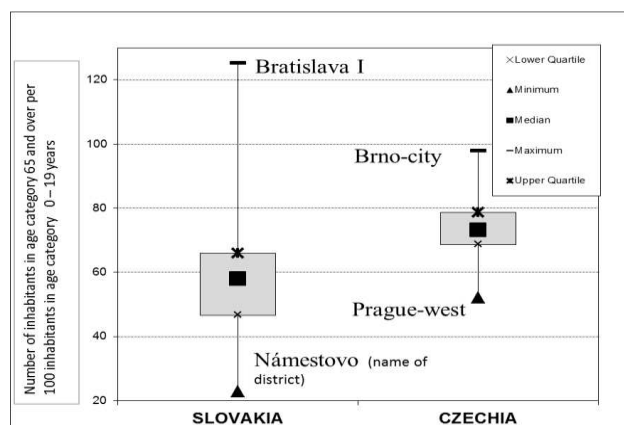


Figure 5. Comparison of aging index for the Slovak and Czech districts in 2009

Source: Statistical Office of Slovakia and Statistical Office of Czechia, 2011.

In 1945, there was 387 people young than 20 years for every hundred elderly persons at aged 65 or over in Czechia. Same results were presented in Slovakia; there were 582 young persons per hundred elderly people in 1945. Over the next 65 years this ratio decreased to 180 % in Slovakia and to 132 % in Czechia. The second largest city in Czechia and its

district Brno-city has shown the lowest age index of population (102.2 %) in 2009 while the Prague-west district has shown the highest age index (192.1 %). On the other hand age index of Slovakia at the level of the analyzed territory presents relatively low values in South and West part of country, having oscillations from 79.8 % in urban district – Bratislava I to 436.1 % in Námestovo region (2009).

One of the measures, to which can be awarded at the population ageing study is average age. So, if is the higher value of average age, the population is getting elder. The average age in Slovakia and Czechia during the 1945 – 2009 periods gradually increased for both genders. For female population in Slovakia, the average age was about 40.1 years in 2009, up from 31.4 in 1960. Average age for male population in Slovakia was increased from 29.3 years in 1960 to 36.8 in 2009. The average age in the more developed and urban districts in Slovakia is more than 11 years higher than in the less developed, rural regions. For Czech districts distinction between region with the lowest value of average age (Prague-west, 38.2 years) and the region with the highest value of average age (Brno-city, 42 years) was in 2009 not more than 4 years.

The age structure of the population can be evaluated according to the index of age and further according to the index of the dependency of young and the index of the dependency of old. It is based on the simple notion that all persons under 20 and those 65 or older are likely to be in some sense dependent on the population in the working ages of 20 – 64. The value of the young dependency ratio in Czechia during the presented period 1945 – 2009 decreased from 51.2 % to 31 %. From 1945 to 2009, the ratio of persons aged fewer than 20 years to those of working age diminished from 69 per hundred to 34 per hundred in Slovakia.

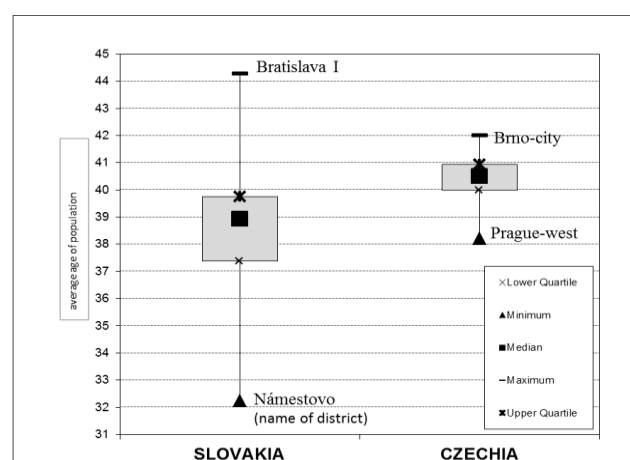


Figure 6. Comparison of average age of population for Slovak and Czech districts in 2009

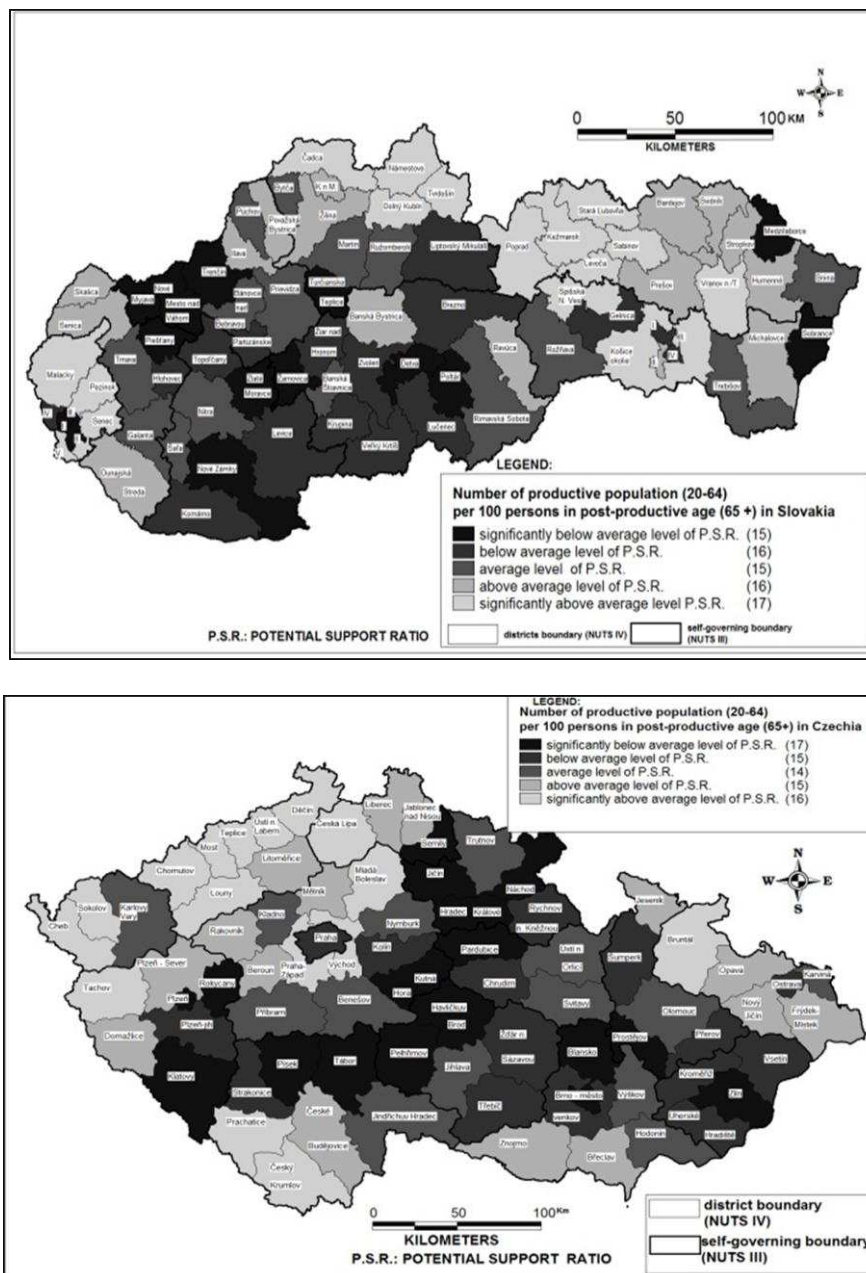
Source: Statistical Office of Slovakia and Statistical Office of Czechia, 2011.

However, it must be recognized that the dependency ratio gives no more than a rough approximation of the burden dependency. Not all young and old persons require support, nor do all working-age persons actually provide direct or indirect support (Tauber, 1992: pp. 23-178). Those in the working ages are assumed to provide direct or indirect support to those in the dependent ages (Kinsella & Gist, 1995).

The aging population is often claimed to increase the support burden on the active middle generations. Various measures of dependency can be cited to illustrate this support burden, but the declining proportion more than offsets the increase in the proportion of the aged, if the dependency burden is only viewed in the context of the ratio of different age groups. The measures which relate various groups of the economically inactive population to the active population describe changes in the support burden more accurately, and also indicate that, while demographic aging necessarily involves an increase in the proportion of the aged inactive population, this increase is more or less compensated for by the decreasing burden imposed by the young generation (Vukovich, 1991: pp. 64). The index of the dependency of young in Czechia districts reached the highest values in Prague-west (36.5 %), Prague-east (34.7 %) and Žďár nad Sázavou (34.6 %), however in Slovakia the highest values of young dependency ratio have been achieved in following districts: Námestovo (56.6 %), Sabinov (55.4 %) and Kežmarok (55 %).

The old population dependency coefficient in the Slovak and Czech regions were increasing during all period being studied, whereas in Czechia it increased by 10.3 percentage points in 2009, as compared with the initial status in 1945, but in Slovakia it was only 6.8 percentage points. In case of Czechia it means, that in 2009 there were almost 24 persons older than 65 years or over for each 100 economically active inhabitants in age category 20 – 64 years. It is significant, that in both countries age structure of their inhabitants is unfavorable. The number of post-productive inhabitants is rising and the number of people at the productive age is failing in the long term.

The number of working-age people per older person is expected to drop in all districts across the Slovakia and Czechia. The coefficient of total burden on productive population imposed by the pre-productive and post-productive populations in a period covering 1945 – 2009 was gradually decreasing in Czechia from 64.4 % to 54.6 % and in Slovakia dropped from 81 % to 52.4 % due to rapidly diminished of young people in age structure of population. In Czechia (2009) there were 55 young and old people dependent on 100 inhabitants (20-64 years).



Figures 7,8. Development of potential support ratio in Slovak and Czech districts, 2009

Source: Statistical Office of Slovakia and Statistical Office of Czechia, 2011.

Inflow and outflow coefficients, the direct expression the situation when five-years old age group of population is preparing to reach the lower or upper age limit marking the productive life span.

Inflow coefficient for Czech districts fell from 14 to 7.5 % in observed period 1945 – 2009. Similar trend of development the inflow coefficient we can notice in Slovak districts. The highest concentration of population aged 20 – 24 years was indicated in Czech districts Prague – west, Prague – east. In Prague – west there is almost 9 people aged 20 – 24 per 100 inhabitants in the reproductive age (20 – 64 years).

Outflow coefficient in Czechia has been rising from 6.8 % (1945) to 11 % (2009). It means that nearly 11 people aged 60 – 64 per 100 inhabitants in the

reproductive age (20 – 64 years). Outflow coefficient in Slovakia acquired lower values during the observed period, increased from 5.7 % (1945) to 7.9 % (2009). Districts like Děčín (11.9 %), Trutnov (11.7 %), Jablonec nad Nisou (11.6 %) in Czechia and Košice IV (13.5 %), Bratislava I (10.8 %), Bratislava IV (9.7 %) achieved the highest values of outflow coefficient. It is significant, that there is a rise of the number of people leaving the productive age for the post-productive one. While at the beginning of the period (1945) being inflow coefficient exceeded the outflow coefficient by nearly 7.2 for Czechia and 12 percentage points for Slovakia, in 2009 it was only -3.5 for Czechia and 3.9 percentage points for Slovakia. It is means, that the inflow of economically active people

Table 1. Population ageing hazard level 2001 – 2009

Population ageing hazard level	Type	Subtype	The level of population ageing	The dynamics of population ageing	Number of units SLOVAKIA	Number of units CZECHIA
High	I	Ia	high	high	15	7
		Ib	high	middle	12	13
		Ic	high	low	0	5
Middle	II	IIa	middle	high	7	8
		IIb	middle	middle	11	10
		IIc	middle	low	8	8
Low	III	IIIa	low	high	4	10
		IIIb	low	middle	3	4
		IIIc	low	low	19	12

Source: author

is still higher (but only in case of Slovakia) than the outflow; however, both the coefficients have been converging in the past years.

The potential support ratio is an alternative way of expressing the numerical relationship between those more likely to be economically productive and those more likely to be dependents. In our study it is inversion of the old-age dependency ratio, that is, the number of people in the working age of 20 – 64 years per every person 65 or older.

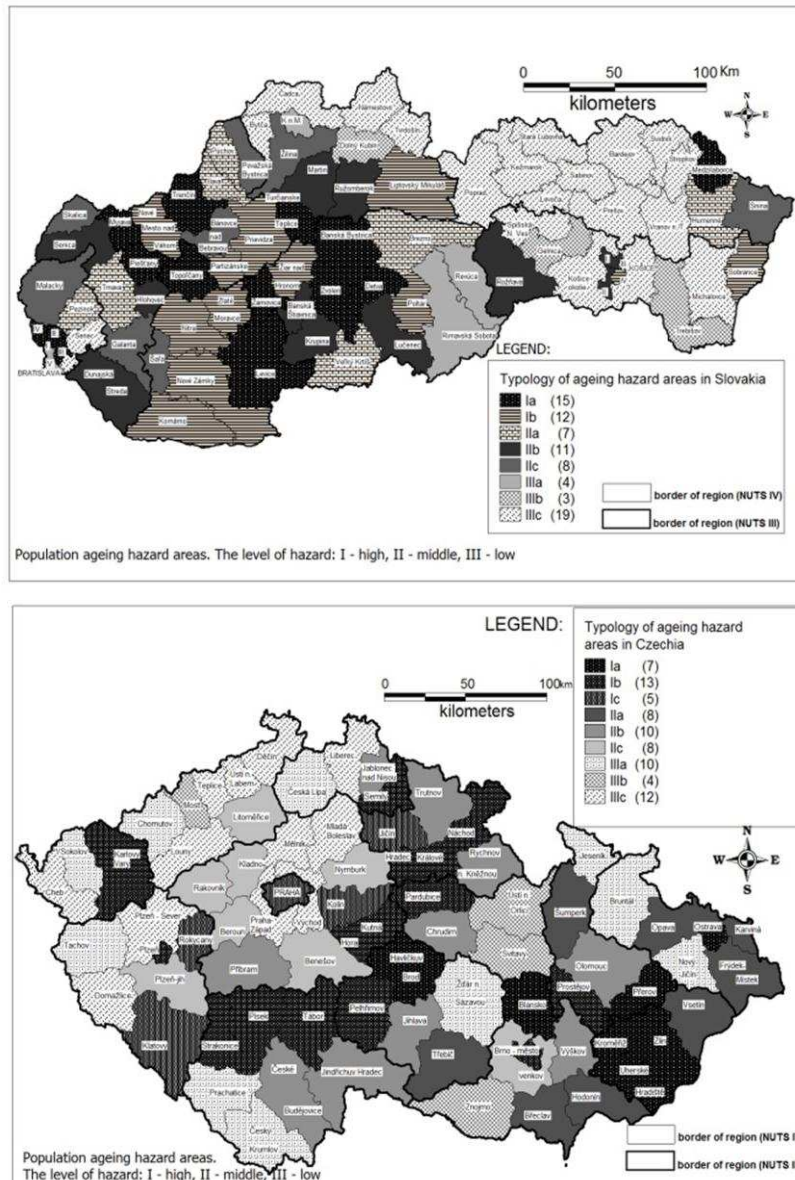
During the last 65 years, the ratio of people aged 20 – 64 to persons 65 or older diminished in both states in Slovakia it was 3.0 percentage points, from 8.4 % in 1945 to 5.4 % in 2009 and in Czechia it was more than 3.3 percentage points, from 7.6 % in 1945 to 4.3 % in 2009. In 2009 difference between highest and lowest value of potential support ratio consisted in Slovak districts 10.7 percentage points, but in Czech districts were this variance significantly lower only 1.7 percentage points. Currently, there are fewer than 6 persons in the working age for every person 65 or older in Slovakia, but in Czechia is situation quite difficult, because there are less than 5 persons in productive age (20 – 64 years) for every person 65 or older. Relatively low ratios could also be found in the areas with high level of population aging like for example Bratislava I (3.4 %), Medzilaborce (3.6 %) as Slovak districts and Brno-city (3.7 %), Pelhřimov (3.7 %) as Czechia districts.

The population ageing in Czechia and Slovakia from a regional point of view

An attempt to identify the areas exposed to ageing was based on the value and growth rate of the age index. To do that, the 2009 index was divided into to the three categories around the average for the whole area and three types the demographic old age were defined – high, medium and low categories. Also the

growth/decrease rates of the index during 2001 – 2009 were divided into to the three groups around the districts average.

As seen in the Table 1 and Figures 9,10 cluster three is comprised units with negative growth, i. e. regions where the population was growing younger. The second cluster encompassed units with positive growth rates but below the region average, while the final group (I) had higher than average growth rates indicating fast-ageing population. Taking into account the current ageing in 2001 and the growth rates during 2001 – 2009, three main types of areas were defined, featuring high, medium and low risk of demographic senility. Each type was further broken down into three subtype's with different ageing rates. Simple and synthetic measures of population ageing, e. g. indexes of absolute and relative numerousness of the population in the post-productive age, selected age categories (age categories 0 – 14, 65 +, 85 +), ageing index etc., however, do not fully illustrate the actual demographic age of society. Far more precise information is provided by the value and growth rate of the age index, i. e. the ratio of old to young population. This measure provides a less biased outlook by taking into account two groups of a population at its external ends. Applied this method yielded a more varied picture adding Czech districts Blansko, Havlíčkův Brod, Kroměříž and Ostrava-city to the group with the highest level hazard for theirs population and districts like Prague-west, Prague-east, Teplice, Plzeň to the group with the lowest level hazard for theirs population, where young age group dominated. The lowest indicates among Slovak districts of population aging hazard level were recorded in North and East part of Slovakia – units Stará Ľubovňa, Spišská Nová Ves, Tvrdošín, Námestovo and Kežmarok. Mentioned group have included units with negative growth (more than 10 percentage points), i. e. units where the population was growing younger. Taking into the account the current ageing in 2009 and the growth/decrease rates



Figures 9,10. Population ageing hazard areas in Czechia and Slovakia, 2001 – 2009
Source: Statistical Office of Slovakia and Statistical Office of Czechia, 2011

during 2001 – 2009, three main of areas were defined, featuring high, medium and low risk of demographic senility, which were presented in Table 2. In

summary, at the time of political and economic transformation districts with high level of urban population have been ageing, while the traditionally,

Table 2. Districts, where is exposed to high level of population ageing hazard in Slovakia and Czechia – according to dynamics of population ageing 2001 – 2009

Subtype	Name of district (level NUTS IV) SLOVAKIA
I a	Banská Bystrica, Bratislava I, Bratislava II, Bratislava III, Bratislava IV, Detva, Levice, Medzilaborce, Myjava, Piešťany, Topoľčany, Trenčín, Turčianské Teplice, Zvolen, Žarnovica (15).
I b	Komárno, Košice IV, Liptovský Mikuláš, Nitra, Nové Mesto nad Váhom, Nové Zámky, Partizánske, Poltár, Prievidza, Sobrance, Zlaté Moravce, Žiar nad Hronom (12)
I c	(0)
Subtype	Name of district (level NUTS IV) CZECHIA
I a	Blansko, Havlíčkův Brod, Kroměříž, Ostrava-město, Přerov, Uherské Hradiště, Zlín (7)
I b	Brno-město, Hradec Králové, Karlovy Vary, Kutná Hora, Náchod, Pardubice, Pelhřimov, Písek, Plzeň-město, Prostějov, Semily, Strakonice, Tábor (13)
I c	Hlavní město Praha, Jičín, Klatovy, Kolín, Rokycany (5)

Source: Statistical Office of Slovakia and Statistical Office of Czechia, 2011.

demographically districts with rural population experienced a slowdown and in some cases a halt to the ageing process.

The foregoing part evaluated the selected demographic indicators separately. To be able to describe the demographic situation of the particular Slovak and Czech districts comprehensively and to create groups of districts with similar aging development, aggregate analysis method of following factors: crude live birth rate, crude death rate, natural increase/decrease, average age, young population dependency ratio, old population dependency ratio, ageing index, age index, inflow and outflow coefficient, percentage of 0 – 19 years old in total population, percentage of 65 years and over in total population were used.

The standardized values are used in groups for classification districts with similar partial factors of population aging. For setting the order of districts by the age of their population based on the selected indicators in 2009, the score of each index was determined as a multiple of the standard value and the given the significance. The negative direction of operation of index was given the opposite sign. The overall score was determined by the sum of the particular scores.

While applying of mentioned factors of measures for comparing the population ageing processes in Czechia and Slovakia it is possible to identify five development stages. The first two groups were represented by districts with very low and low level of ageing in Czechia and Slovakia. Presented categories represent favorable demographic development. There were connected with the highest values of the natural increase, the number of births, then the most favorable index of age, the index of the dependence of young and the index of the dependence of old of all observed districts in Slovakia and Czechia. These districts were occupied area in North and East part of Slovakia as well as Czech-German borderland and Northeast region - Silesia. On the other hand the last two categories have been represented with the high level and very high level of ageing population. Districts belonged to the last two categories struggle with the high percentage of post-productive population as well as high level of old dependency coefficient and outflow coefficient. All mentioned characteristics have had huge impact to demographic development in these regions. The great region in the South-West of Slovakia is characterized by a higher ageing grade. In Czechia the high level of ageing areas are located in following self-governing regions: south and east part of Středočeský kraj, north part of Jihočeský kraj, Královohradecký kraj and Zlínský kraj.

Conclusions

The aim of our research was connected with regionalization of population ageing, however mentioned procedure an extremely difficult task on account of diversity of age structure in Slovak and Czech districts. The next difficulty in classifying this phenomenon in modern societies is the fact that population ageing is a complex and widespread process and rejuvenation practically does not exist. The basic similarity between Slovak and Czech districts is in the development of the young population dependency ratio, old population dependency ratio, ageing index, age index, inflow and outflow coefficient are recording in time with the failing trend.

Due to internal migration predominantly economically active population from biggest Czech and Slovak cities neighboring districts obtained new young, reproductive inhabitants. Typical for large cities are migration flows in and out of town occurring largely within the (greater) area of the cities.

For example, out of 18.9 thousand people who moved out of the City of Prague in 2006, 7.1 thousand moved to neighboring districts of Prague-West (3.8 thousand) and Prague-East (3.3 thousand). A total of 6.7 thousand moved out of Brno, mainly to the suburban district Brno-Rural – 39.1 % of all migrants (Štyglarová, 2009: pp. 3-22).

Another group of districts with low or very low level of ageing is positioned in Northwest of Czechia (Sudetenland). It was connected with forced Germans after end of World War II. German population was transferred out of the country; the former Sudetenland was resettled, mostly by Czechs from rural areas but also by other nationalities of Czechoslovakia: Slovak, Greeks (arriving in the wake of Greek civil war), and Gipsy population. As a result of different demographic behavior population in Sudetenland was younger and growing faster than in the other Czech regions.

In Slovakia, similar processes of residential suburbanization in the hinterland of Bratislava and Košice as well as others largest cities started at the end of twenty century and continuing to the present days. Mentioned processes of residential suburbanization affected to the net migration, number of inhabitants and population aging hinterland districts. If we analyze the representation of aging in districts of Slovakia, we can determinate favorable units in North- and East Slovakia with low aging. In East part of Slovakia (districts Kežmarok, Spišská Nová Ves, Gelnica) it is result of relatively high level of fertility their inhabitants, which belongs to Gipsy minority and distinctive rural landscape of North Slovakia (historical region Orava and Kysuce).

The transition to a market economy in Slovakia and Czechia and all its social consequences, but also its new opportunities of self-realization, led to changes in demographic behavior. Due to current curbing of social benefits aimed at families with children, the scope of social security narrowed and unemployment appeared as a new reality of Velvet revolution in November 1989, negatively affecting couples considering marriage and potential parents. These new conditions for individuals and families were weighed within a free and sensible decision-making process concerning family life and the position of children in the family. Negative consequences are certainly brought about by postponing rent deregulation, by flat shortage originating from the conversion of existing flats to commercial use, by uncertain range and structure of social housing etc. For some young people their present, respectively future family housing situation remains a serious issue in their decision-making in terms. Aging is significantly influenced by the situation on the labor market. Therefore, decreasing fertility is also contributed to by the unemployment of young people and financial difficulties in obtaining housing.

We mentioned mainly about social aspects of ageing process, but there are also biological and psychological aspects of ageing population. According to (Mucha & Krzyżowski, 2010: pp. 247-260), biological ones are clearly visible for instance in disease which become evident at a mature age, such as Parkinson's or Alzheimer's diseases. Old people get more and more engaged in activities that used to be associated only with the "youth culture". Moreover, this development opens a new sphere of prefigurateness and raises the need for strengthened intergenerational relations.

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