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Selected factors of depopulation in South-Eastern Europe

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Abstract. The transformation processes in the political, social, and economic spheres taking place at the turn of the twentieth and twenty-first centuries in South-Eastern Europe (SEE) resulted in negative demographic phenomena. The aim of the study discussed in the article is to assess the geographical distribution of the demographic age, determine the indices of the dynamics of the ageing process of the SEE population and explain the relationship between the natural movement, fertility and the level of migration. The study is based on the data for the years 1990–2020 from a database of the World Bank.

The study used the static method to determine the structure of the demographic old age and the dynamic method to determine in which phase of ageing the population was. Natural movement balances were examined using the least squares method. The study found that the population of the SEE residents in the tested period decreased by nearly 8 million (by 12% of the SEE total population from 1990). The proportion of people aged 65 and over in the total population increased from 9.6% to 18.7%, and the ratio of residents aged 65 and over to those under 15 exceeded 100%. Further study of this phenomenon will help understand the ageing patterns of the SEE population, which may facilitate the application of specific policies designed to mitigate the negative effects of depopulation in the region.

Keywords: depopulation, population ageing, South-Eastern Europe
JEL: C30, E10, J10

Wybrane czynniki depopulacji w Europie Południowo-Wschodniej

Streszczenie. Procesy transformacyjne zachodzące na przełomie XX i XXI w. w Europie Południowo-Wschodniej, które obejmowały sferę polityczną, społeczną i gospodarczą, przyniosły skutki w postaci negatywnych zjawisk demograficznych. Celem badania omawianego w artykule jest ocena przestrzennego zróżnicowania poziomu starości demograficznej, określenie dynamiki procesu starzenia się ludności oraz wyjaśnienie zależności pomiędzy ruchem naturalnym, dzietnością i saldem migracji w tym regionie Europy. Badanie opierało się na danych z bazy Banku Światowego za lata 1990–2020.

Do określenia poziomu starości demograficznej wykorzystano metodę statyczną, a do określenia fazy starzenia się populacji – metodę dynamiczną. Saldo ruchu naturalnego zostało obliczone przy użyciu metody najmniejszych kwadratów. Z badania wynika, że w analizowanym okresie populacja mieszkańców Europy Południowo-Wschodniej zmniejszyła się o blisko 8 mln (12% ogółu populacji w 1990 r.). Udział osób w wieku 65 lat i więcej w populacji ogółem wzrósł z 9,6% do 18,7%, a stosunek osób w wieku 65 lat i więcej do osób poniżej 15. roku życia

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przekroczył 100%. Przeprowadzone badanie powinno być kontynuowane w celu zrozumienia wzorców starzenia się populacji w tym regionie, dzięki czemu łatwiejsze może się stać wprowadzenie odpowiednich polityk umożliwiających złagodzenie negatywnych skutków depopulacji.
Słowa kluczowe: depopulacja, starzenie się ludności, Europa Południowo-Wschodnia

1. Introduction

The impact of demographic conditions on socio-economic processes has for decades been the subject of interest of various scientific disciplines, including economics. The latter analyses the relationship between demographic development and economic growth or/and socio-economic development. Demographic and socio-economic relations have both a dynamic and multidimensional nature. Therefore, an exhaustive discussion of the topic is neither possible nor necessary in the context of the tasks posed to the macro scale.

For several decades, the world has been experiencing significant population changes, the dynamics and direction of which raise many concerns. Declining birth rates accompanied by increasing life expectancy inevitably lead to demographic ageing (Urbaniak et al., 2015). The negative consequences of this process affect many areas of the socio-economic life. Demographic changes influence the condition of the economy, the pension system, the labour market, the functioning of enterprises, and the market of consumer goods and services. Therefore, the interest in the issue of population ageing is already very high and will certainly increase if the negative transformations in the age structure of the population continue (Jurek, 2012).

The phenomenon of ageing is linked to that of reduced fertility and birth rates. The socio-economic factors (income and education levels, employment opportunities and access to the healthcare and social welfare services) as determinants of fertility decline are not new in modern history. In the interwar period, both in Western Europe and in the USA, fertility declined below the level of simple reproduction and a negative population growth was recorded (Van Bavel, 2010). The great interest of researchers in this problem resulted in several attempts to solve it systematically (Coleman & Rowthorn, 2011). Throughout the following years of the 20th century, the world faced the issue of uncontrolled population growth and the devastating consequences of this phenomenon on a global scale.

In the literature, studies on depopulation have been conducted relatively often. However, constant monitoring of the process of population ageing and the analysis of the causes of this phenomenon may help to diversify measures to mitigate the adverse consequences.

Studies on population ageing can be carried out in a static system, i.e. aiming to determine the structure of demographic old age in a given area at a certain time, or in a dynamic system – detecting changes in this area (Kurek, 2008).

The countries selected for the analysis are related to each other in different ways. The group consists of European Union member states, i.e. Bulgaria, Croatia, Greece, Romania and Slovenia, of countries which for over 70 years constituted the Socialist Federal Republic of Yugoslavia (Yugoslavia), i.e. in addition to Croatia and Slovenia, Bosnia and Herzegovina, Serbia, Montenegro and North Macedonia (Fawn, 2008; Macek-Macková, 2011), and Albania.

Except Greece, all the above-mentioned countries operated under some variation of a communist-socialist political and economic system.

In the last decade of the 20th century and at the beginning of the 21st century, the economic and political situation in the study area was changing dramatically. Therefore, the article focuses on the period of 1990–2020. An attempt was made to determine the correlation between the changes and depopulation in the SEE countries.

The aim of the study discussed in the article is to assess the geographical distribution of the demographic age, determine the indices of the dynamics of the ageing process of the SEE population and explain the relationship between the natural movement, fertility and the level of migration.

2. Literature review

It is only since the end of the last century that the effects of the medium-term polarisation of trends in demographic development in various regions of the world and the long-term consequences of the ageing of populations in developed countries have been further considered and studied.

Thus, it turns out that the problems of demographic development are more complicated than it was assumed in the theory of the first demographic transition, according to which – after a period of temporary population growth due to falling mortality and temporarily high fertility – demographic development will follow a pattern similar to a stationary population, characterised by fertility rates fluctuating around the level of simple reproduction and low mortality (Kirk, 1996).

The lack of hard empirical evidence for the above assumptions led to the emergence of the second demographic transition theory (Barro & Becker, 1989; Cigno & Rosati, 1992). In empirical terms, it replaces the simple reproduction pattern with the narrow reproduction one, in which the number of newly-born people is lower than the number of deaths in a given year. Supporters of this theory indicate the cultural and sociological reasons for such a situation, in particular the change of a family model, including such phenomena as:

- the shift from traditional marriage to cohabitation;
- the shift of focus from the child to the adult;
- the replacement of informed procreation by preventive contraception;
- the hitherto-homogeneous family and household type replaced by other formats of a family or household to some extent (Kurkiewicz, 1998).

It is worth noting that there is no unanimity among demographers, sociologists or economists are as to whether limited reproduction should be considered a permanent or temporary phenomenon, especially because in the context of socio-economic factors, the second transition theory does not point to other causes of changes in the reproduction pattern than the first transition theory.

It is easy to show, on theoretical grounds, that in an indefinite prospect of time, the human population can neither increase nor decrease indefinitely (Reher, 2007). Therefore, the growth of the world population, sooner or later, is expected to slow down or even reverse. Probably after a multi-decade, a multi-decadal population decline will be followed by a long-term growth, which in turn will be followed by another decline. The human population in a very long term will most likely be tending towards a stationary state, but some approximations of this state will last for decades or even centuries (Reher, 2007).

Population ageing has not unequivocally negative consequences. The absolute risks of an ageing society are:

- a slowdown in economic growth both in absolute terms and per capita;
- deterioration of public and external security;
- weakening of political standing on the international stage;
- a slowdown in the growth of social labour productivity (Coleman & Rowthorn, 2011).

However, some advantages of this phenomenon can also be observed:

- shrinking labour force can increase the employability of workers and improve quality of life by reducing congestion and commuting time (Tal, 2016);
- shrinking economy, paradoxically, can have a positive impact on many determinants of well-being, including income and wealth per capita (Matsutani, 2006);
- lower fertility rates contribute to increased investment per child (Lee et al., 2014). Older generations passing on their wealth to fewer successors improves the initial situation of young people, leading to greater wealth accumulation (Kluge et al., 2014);
- a smaller population means less energy consumption. It is estimated that a decrease in the population can contribute to significant reductions in carbon dioxide and other greenhouse gas emissions (Kluge et al., 2014; O'Neill et al., 2010; Wei et al., 2018);
- population decline also translates into less pressure to convert forests and wetlands to areas of intensive agriculture and contributes to sustainable biodiversity (Götmark et al., 2018);
- enhances professional activation of young people and less productive social groups.

As a result of the demographic transformation, we should expect a more equal distribution of wealth in a society and some reduction of socio-economic inequalities.

The progress of population ageing is inevitable. According to demographic forecasts presented in the *Lancet* journal, in 2100, just one birth for every person aged 80 is projected, whereas in 1950 there were 25 births for every person turning 80, and seven in 2017 (Vollset et al., 2020). The same article points out that European countries, including the countries of the Balkan Peninsula, reached net reproduction rates below the generation replacement level as early as before 2000. The only exception is Albania, where this phenomenon occurred in 2019.

Thus, the issue of changes in the state and structure of a population is extremely important and must be taken into consideration in the planning of the national socio-economic policy (Kłos & Russel, 2016).

Due to the progressing ageing of the SEE population and the importance of the consequences of this process for the socio-economic development of the countries (Zienkiewicz, 2021), it is important to analyse the phenomenon from the point of view of what stage it is in, its dynamics, and the geographical distribution of old age.

3. Research method

The study's goal is to assess the level of depopulation in the period of 1990–2020, in individual countries of SEE in terms of:

- the phase of the ageing of a population in static terms;
- the phase of the ageing of a population in dynamic terms;
- the dependence of the balance of natural movement on such factors as fertility and migration levels.

The study covered the area of former-Yugoslavia countries (except Kosovo and Metohija), i.e. Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia and Slovenia, as well as Albania, Bulgaria, Greece and Romania. Kosovo and Metohija was excluded from the study due to its unregulated international status and the absence of data (the territory is under United Nations Security Council Resolution No. 1244/99). Data came from DataBank, the World Bank's statistical database.

Studies on population ageing were conducted by means of:

- the static method, to determine the phase of the ageing of a population in a given area at a certain point in time, using the old-age coefficient and the index of demographic old age;
- the dynamic method, to determine the stage of population ageing using the demographic ageing index, based on point differences between the proportions of young and old people.

Using the method of the least squares, the authors tried to determine the linear regression equations of natural movement balances in the tested countries in relation to fertility and migration levels.

To assess the phase of the ageing of a population in static terms (at a given time t) and assuming that the age of 65 onwards is old age, whereas 0–14 years forms the youngest group, the following quantitative characteristics were used in the study (Kurkiewicz, 2010):

- the Old Age Coefficient (OAC) W_s, which is a structure indicator that determines the proportion of the population classified as elderly in the total population:

$$W_s = (L_{65+}/L) \cdot 100\%; \tag{1}$$

- the Demographic Ageing Index (DAI) I_s, indicating the burden of the oldest group on the youngest group:

$$I_s = (L_{65+}/L_{0\text{–}14}) \cdot 100\% \tag{2}$$

where:
L is the total population at time t,
L_{65+} is the population aged 65 and over at time t,
L_{0-14} is the population aged 0–14 at time t.

The OAC W_s structure indicator is referred to as the ageing rate and denotes the percentage of elderly people in the total population. According to the UN scale used nowadays to measure the advancement of the population ageing process, a population is considered old when the proportion of people aged 65 and over in the total population is 14–21%. When it exceeds 21%, the population is defined as hyper-aged. A population is considered young when the proportion of people aged 65 and over is less than 4%, mature when this proportion is 4–7%, and ageing when it is 7–14% (United Nations, 2005).

The DAI I_s is based on the relationship between the size of the oldest group (aged 65 and over) and the youngest one (aged 0–14). The older the population, the higher the value of the DAI I_s. The actual demographic old age of the population begins when the 0–14 age group becomes smaller than the group of people aged 65 and over (Kowaleski, 2011).

To measure the advancement of the population ageing process in dynamic terms (in a specific time period), we used the Demographic Ageing Coefficient (DAC) W_{sd}

based on point differences between the proportions of young and old people (Długosz, 1998):

$$W_{sd} = \left(U_{0-14,\,t} - U_{0-14,\,t+n}\right) + \left(U_{65+,\,t+n} - U_{65+,\,t}\right), \tag{3}$$

where:

$U_{0-14,\,t}$ is the proportion of people aged 0–14 in the total population at the beginning of the reference period,

$U_{0-14,\,t+n}$ is the proportion of people aged 0–14 in the total population at the end of the reference period,

$U_{65+,\,t}$ is the proportion of the population aged 65 and over in the total population at the beginning of the reference period, and

$U_{65+,\,t+n}$ is the proportion of the population aged 65 and over in the total population at the end of the reference period.

The above proportions were expressed as fractions (values ranging from 0 to 1). The DAC W_{sd} values greater than 0 indicate population ageing. Higher values of this indicator point to greater dynamics of the population ageing process. Lower values of the DAC W_{sd} indicate the rejuvenation of a population. The process of rejuvenation is more intensive as the values of the indicator become smaller.

Considering that populations of SEE countries have been ageing, an attempt was made to explain the dependence of the natural movement balance on such factors as fertility and migration levels. For this purpose, linear regression equations of this dependence were determined for each of the SEE countries:

$$y_{gr} = \alpha + \beta_1 x_{fr} - \beta_2 x_{mr}, \tag{4}$$

where:

y_{gr} is the rate of natural increase,

α, β_1, β_2 are structural parameters,

x_{fr} is the total fertility rate, and

x_{mr} is the net migration rate.

The authors are aware of the limitations of the presented research. One of them relates to the ‘narrowness’ of the studied problem. The presented results of dependency analysis do not and cannot give a wide picture of the depopulation process. Another limitation is the fact the research period is too short from the point of view of demographic processes. Choosing 1990 as the beginning of the research period has some justification; however, even then there were differences among the

SEE countries in terms of economic development and political and demographic situation. This has not been elaborated on in the paper, though, due to the limitations on the permissible length of the text. In addition, during the study period, the societies of the SEE countries underwent significant cultural and sociological changes. This research has been designed as the contribution to the future research, investigating other determinants of depopulation.

4. Results and discussion

SEE countries are diverse in terms of population size (Table 1). The total population of SEE was 58.8 million people in 2020. Compared with 1990, a population drop of up to 12.0% (by 8.0 million people) can be observed. The largest proportions of the SEE population live in Romania (33.9% in 1990 and 28.9% in 2020), Greece (15.3% in 1990 and 16.0% in 2020), Bulgaria (13.0% in 1990 and 10.4% in 2020) and Serbia (11.4% in 1990 and 10.3% in 2020).

Table 1. Population of South-Eastern Europe by country of residence

Country	1990	1995	2000	2005	2010	2015	2020
	in thousands						
Total	**66,831**	**65,500**	**64,864**	**63,145**	**61,692**	**60,179**	**58,804**
Albania	3,287	3,188	3,089	3,011	2,913	2,881	2,838
Bosnia and Herzegovina	4,463	3,829	3,751	3,765	3,705	3,429	3,281
Bulgaria	8,718	8,406	8,170	7,659	7,396	7,178	6,934
Croatia	4,777	4,620	4,468	4,310	4,295	4,204	4,047
Greece	10,197	10,562	10,806	10,987	11,121	10,821	10,716
Montenegro	606	612	605	614	619	622	621
North Macedonia	1,996	1,983	2,026	2,037	2,055	2,070	2,073
Romania	23,202	22,684	22,443	21,320	20,247	19,816	19,286
Serbia	7,586	7,625	7,516	7,441	7,291	7,095	6,908
Slovenia	1,998	1,990	1,989	2,000	2,049	2,064	2,100

Source: authors' work based on The World Bank (n.d.).

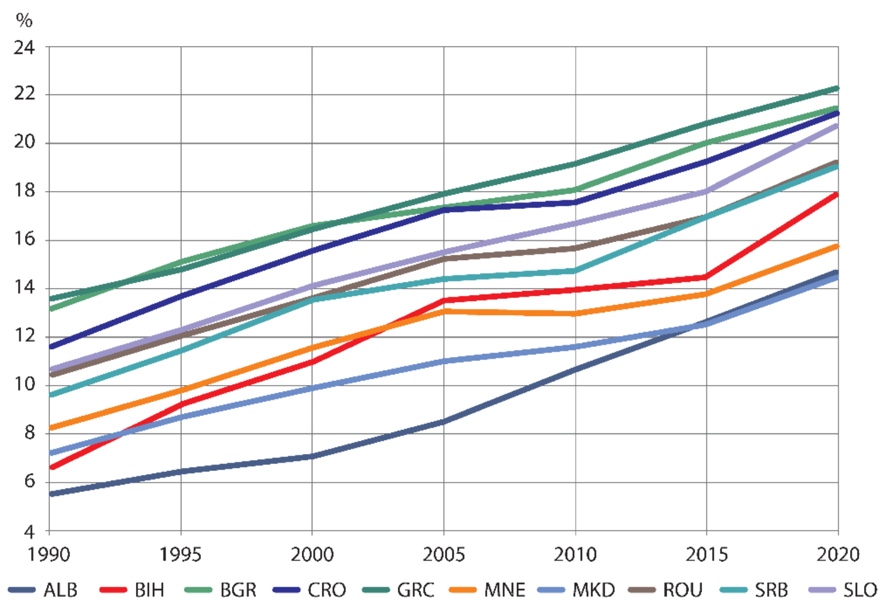
Countries with the lowest population share in the region are: Montenegro (0.9% in 1990 and 2020), North Macedonia (3.0% in 1990 and 3.1% in 2020) and Slovenia (3.0% in 1990 and 3.1% in 2020).

Between 1990 and 2020, the population of the region significantly shrank. The vastest population losses, compared to the beginning of the studied period, were observed in Bosnia and Herzegovina (by 26.5%), Bulgaria (by 20.5%) and Romania (by 16.9%). However, some countries recorded the opposite – a population growth during the period under study. These were Greece (growth by 5.1%), Slovenia (by 5.1%) and North Macedonia (by 3.8%).

The biggest changes in the population size of the region were recorded in two periods. The first one, from 1990 to 2000, is important in the context of countries formed after the break-up of Yugoslavia. At that time, mass internal and external migrations were observed (Eberhardt, 2005; Vandeburie, 2011; Zienkiewicz, 2015). The second period began in 2005 and continues to the present day, being the result of the enlargement of the European Union (Gethau, 2011; Kontzamanis & Pilidis, 2011). In this period, migration from SEE countries to the countries of the 'old' EU intensified.

The degree of demographic ageing can be determined in the simplest way by determining the ageing coefficient, i.e. the proportion of people aged 65 and over in the total population. Changes in this proportion observed between 1990 and 2020 indicate strong ageing of the SEE population (Figure).

Figure. Share of people aged 65 and over by country of residence



Note. ALB – Albania, BIH – Bosnia and Herzegovina, BGR – Bulgaria, CRO – Croatia, GRC – Greece, MNE – Montenegro, MKD – North Macedonia, ROU – Romania, SRB – Serbia, SLO – Slovenia.
Source: authors' calculation based on The World Bank (n.d.).

While in 1990 the share of the oldest group fluctuated between 5.0% and 14.0% with the average of 9.6%, in 2020 it reached between 14.5% and 22.3%, with the average of 18.7%.

Figure indicates that the SEE population is significantly advanced in the ageing process, with very high dynamics for the whole area. The trend lines of the proportion of the population aged 65 and over are, with a few exceptions, parallel, indicating the homogeneity of the SEE-population-ageing phenomenon. Table 2 compares the level of demographic old age and the process of ageing of the population of individual countries based on point changes in the value of the OAC in 1990, 1995, 2000, 2005, 2010, 2015 and 2020.

Table 2. Old Age Coefficient W_S

Country	1990	1995	2000	2005	2010	2015	2020
	in %						
Albania	5.49	6.43	5.81	6.80	10.65	12.63	14.70
Bosnia and Herzegovina	6.58	9.22	5.04	6.64	13.96	14.48	17.92
Bulgaria	13.15	15.11	30.34	30.83	18.08	20.02	21.47
Croatia	11.58	13.69	6.44	6.77	17.56	19.25	21.25
Greece	13.56	14.79	29.38	32.04	19.15	20.82	22.28
Montenegro	8.24	9.80	3.45	3.94	12.97	13.78	15.77
North Macedonia	7.20	8.70	0.89	1.05	11.60	12.52	14.48
Romania	10.41	12.05	40.63	43.64	15.67	16.97	19.23
Serbia	9.59	11.44	51.16	53.56	14.74	16.96	19.06
Slovenia	10.64	12.29	14.11	15.50	16.69	18.01	20.74

Source: authors' work based on The World Bank (n.d.).

Demographically, the oldest countries in 1990 were: Greece, where the share of people aged 65 and over in the total population was 13.56%, Bulgaria (13.15%), Croatia (11.58%), Slovenia (10.64%) and Romania (10.41%).

The same countries had the highest percentage of population aged 65 and over in 2020. It is worth mentioning that Serbia joined that group, with a 19.6%-share of people aged 65 and over. Thus, one could say that Greece, Bulgaria, Croatia, Slovenia, Serbia and Romania are demographically the oldest countries in the SEE region. In all these countries, there has been an increase in the proportion of people aged 65 and over by about 8.8 p.p.

The process of population ageing cannot be considered only in relation to the elderly population. To provide a more complete picture of the demographic situation, it is necessary to see what proportion of the population is constituted by children and young people. This is possible thanks to the DAI I_S (Živić & Pokos, 2005).

The largest increases in the number of population aged 65 and over were observed in Bosnia and Herzegovina (by 172.1%), Albania (by 167.6%) and North Macedonia (by 100.9%). Table 3 demonstrates that the greatest increases in the DAI I_S were recorded in Bosnia and Herzegovina, where an increase by 96.11 p.p. occurred, Greece (by 94.14 p.p.) and Croatia (87.66 p.p.). Increases in the DAI I_S of over 80 p.p. were also recorded in Slovenia (85.68 p.p.), Serbia (83.70 p.p.) and Romania (80.10 p.p.).

Table 3. Demographic Ageing Index I_s

Country	1990	1995	2000	2005	2010	2015	2020
	in percent						
Albania	16.77	19.65	23.27	32.08	47.41	67.63	85.31
Bosnia and Herzegovina	27.26	41.88	52.99	76.36	88.71	95.01	123.37
Bulgaria	64.61	84.34	105.97	127.43	133.95	140.25	146.24
Croatia	58.49	74.20	89.86	109.64	113.71	132.36	146.15
Greece	69.04	87.31	109.08	121.62	127.21	143.00	163.18
Montenegro	32.41	41.82	53.94	64.74	67.38	74.51	87.39
North Macedonia	27.51	34.63	43.61	54.46	64.77	74.35	88.76
Romania	43.81	57.97	73.21	96.77	99.31	109.27	123.91
Serbia	40.32	51.85	66.04	76.95	85.03	104.90	124.02
Slovenia	51.33	67.50	89.46	110.98	119.29	122.79	137.01

Source: authors' work based on The World Bank (n.d.).

A worryingly-high increase in the burden of the oldest group on the youngest group was observed in the studied region. It should be noted that until 2000, the DAI I_s had not exceeded 100%. In subsequent years, the situation steadily deteriorated. In 2020, in seven out of the 10 above-mentioned countries, the index went significantly over 100%. In the remaining three countries, i.e. Albania, Montenegro and North Macedonia, the DAI I_s exceeded 80%, and its growth dynamics were high. It is important to note that very high dynamics of change in the average DAI I_s value occurred for the studied region during the research period. While in 1990 the average DAI I_s value for the area was 43.16%, in 2020 it was as much as 122.53% (an increase by 184%). Thus, the entire area of SEE can be considered as a demographically old area with high ageing dynamics.

Synthetic determination of the advancement of the ageing process in dynamic terms is possible by using the DAC W_{sd}, which takes into account simultaneous changes in the size of the oldest and the youngest populations. Table 4 presents the values of this indicator for individual SEE countries, while Map presents the relevant cartogram.

Table 4. Demographic Ageing Coefficient W_{sd}

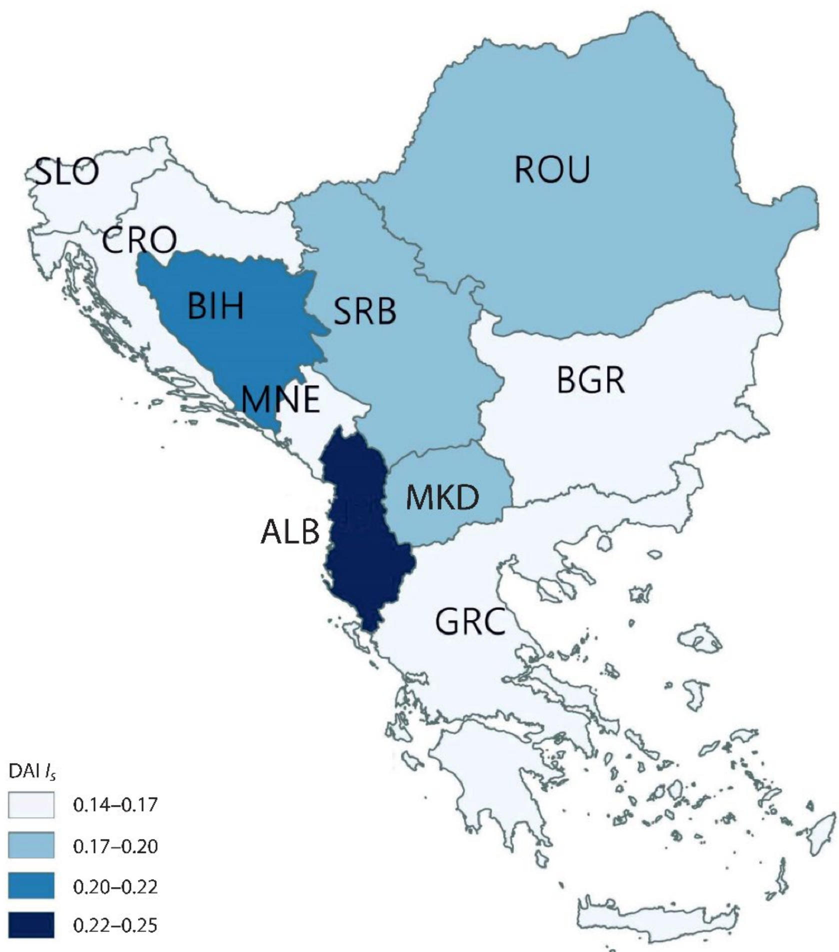
Country	1990–1995	1995–2000	2000–2005	2005–2010	2010–2015	2015–2020	1990–2020
Albania	0.01	0.03	0.05	0.06	0.06	0.04	0.25
Bosnia and Herzegovina	0.05	0.03	0.06	0.02	0.01	0.04	0.21
Bulgaria	0.04	0.04	0.03	0.01	0.01	0.01	0.14
Croatia	0.03	0.03	0.03	0.01	0.03	0.02	0.15
Greece	0.04	0.04	0.02	0.01	0.02	0.02	0.15
Montenegro	0.04	0.04	0.03	0.01	0.02	0.02	0.15
North Macedonia	0.03	0.04	0.04	0.03	0.02	0.02	0.17
Romania	0.05	0.04	0.04	0.00	0.02	0.02	0.17
Serbia	0.04	0.04	0.03	0.02	0.03	0.03	0.18
Slovenia	0.04	0.04	0.03	0.01	0.01	0.02	0.16
Average value for SEE	0.04	0.04	0.04	0.02	0.02	0.03	0.17

Source: authors' work based on The World Bank (n.d.).

The evolution of this indicator in the studied periods allows us to conclude that the dynamics of the population ageing process was significant until 2005. In the following two five-year periods, the dynamics of intertemporal changes in the DAC W_{sd} slowed down slightly (to 0.02). In the period of 2015–2020, there was a negative rebound and the DAC W_{sd} increased to 0.03.

It is worth noting that in the period 2015–2020, the dynamics of the ageing process slowed down, especially in Bulgaria (to 0.01). This phenomenon should be seen as positive, because it might indicate the growing demographic potential of this country. However, in the case of Bosnia and Herzegovina, where the DAC W_{sd} was 0.04, we can talk about the acceleration of the population ageing.

Map. Demographic Ageing Index I_s years 1990–2020



Note. Abbreviations as in Figure. Right half-open intervals.
Source: authors' calculation based on The World Bank (n.d.).

In the whole period of 1990–2020, the examined indicator took a very high average value of 0.17. The process of ageing of the population of SEE in this period, measured using the DAC W_{sd}, was most intense in Albania (0.25), Bosnia and Herzegovina (0.21) and Serbia (0.18).

The value of the index for other countries of the region was also very high, ranging between 0.14–0.18.

Population ageing is conditioned by many factors. Table 5 presents the dependence of the natural movement balance on the fertility rate and the level of net migration. The results of the analysis show the heterogeneity of the studied area in this respect.

Table 5. Linear regression equations of the natural movement rate with respect to the fertility and migration levels. Estimates of parameters α, β_1 and β_2 of linear regression

Country	Regression equation	Index	*t*-stat	*p*-value for *t*-stat	Std. error	R^2	Adjusted R^2	*p*-F
ALB	$y_{gr} = -11.12 + 9.09\ x_{fr} - 0.12\ x_{mr}$	α	−26.34	0.00	0.42			
		β_1	24.99	0.00	0.36	0.996	0.995	0.00
		β_2	−4.48	0.00	0.03			
BIH	$y_{gr} = -22.21 + 16.69\ x_{fr} + 0.04\ x_{mr}$	α	−14.87	0.00	0.42			
		β_1	14.85	0.00	0.36	0.929	0.923	0.00
		β_2	2.69	0.01	0.03			
BGR	$y_{gr} = -9.54 + 2.93\ x_{fr} - 0.10\ x_{mr}$	α	−5.07	0.00	1.88			
		β_1	2.24	0.03	1.31	0.248	0.191	0.00
		β_2	−1.99	0.05	0.05			
CRO	$y_{gr} = 3.37 - 3.76\ x_{fr} - 0.01\ x_{mr}$	α	1.75	0.09	1.93			
		β_1	−2.78	0.01	1.35	0.242	0.184	0.03
		β_2	−0.55	0.59	0.02			
GRC	$y_{gr} = -6.63 + 4.20\ x_{fr} + 0.21\ x_{mr}$	α	−1.61	0.12	4.12			
		β_1	1.37	0.18	3.06	0.329	0.278	0.01
		β_2	3.49	0.00	0.06			
MNE	$y_{gr} = -34.37 + 20.58\ x_{fr} - 0.02\ x_{mr}$	α	−15.53	0.00	0.42			
		β_1	16.44	0.00	0.36	0.964	0.961	0.00
		β_2	−0.53	0.60	0.03			
MKD	$y_{gr} = -15.65 + 11.61\ x_{fr} - 0.02\ x_{mr}$	α	−14.87	0.00	1.05			
		β_1	17.30	0.00	0.67	0.971	0.968	0.00
		β_2	−0.05	0.96	0.04			
ROU	$y_{gr} = 0.38 - 1.74\ x_{fr} - 0.05\ x_{mr}$	α	0.22	0.83	1.78			
		β_1	−1.45	0.16	1.20	0.124	0.057	0.18
		β_2	−1.26	0.22	0.04			
SRB	$y_{gr} = -1.81 - 1.48\ x_{fr} - 0.17 x_{mr}$	α	−2.81	0.00	0.64			
		β_1	−3.07	0.00	0.48	0.298	0.244	0.00
		β_2	−1.54	0.14	0.11			
SLO	$y_{gr} = -4.44 + 3.39\ x_{fr} - 0.05\ x_{mr}$	α	−3.96	0.00	1.12			
		β_1	4.21	0.00	0.81	0.405	0.359	0.00
		β_2	−1.01	0.32	0.05			

Note. Abbreviations as in Figure.

Source: authors' work based on The World Bank (n.d.).

In the case of three of the 10 SEE countries, i.e. Albania, Bosnia and Herzegovina and Bulgaria, all structural parameters are statistically significant. However, only for two of them (Albania and Bosnia and Herzegovina) the coefficient of determination (R^2) has high values (0.996 and 0.929, respectively). This means that the linear regression equations for these countries are very well-fitted to the empirical data, and the statistical significance of the structural parameters reinforces the accuracy of this fit. Considering the situation in the above-mentioned countries, and assuming a constant fertility rate (x_{fr} = *ceteris paribus*), they will not see any demographic improvement. In the case of Albania, we can observe not only a negative value of the intersection coefficient, but also a negative value of coefficient β_2, which negatively affects the birth rate. Only stopping the level of emigration of young people from Albania and increasing the fertility rate by about 15–20% could save the country from progressive ageing.

In the case of Bosnia and Herzegovina, a significantly-high negative intercept (−22.21) is observed. Despite a relatively high value of coefficient β_1 (16.69), it means that the demographic ageing of population of Bosnia and Herzegovina will also continue. The high negative intersection coefficient indicates significant losses in the population of this country caused directly by the tragic events of that period – warfare, war crimes (genocide) and forced displacement and emigration, all of which took place in the last decade of the 20th century.

Two other countries with a high coefficient of determination (R^2) are Montenegro (0.964) and North Macedonia (0.971). In both cases the coefficients at the fertility variable are statistically highly significant. In addition, the values of the adjusted coefficients of determination in these countries are very close to the values of the basic coefficient of determination (MNE 0.961 and MKD 0.968). Such convergence, paired with the lack of statistical significance of the coefficients at the migration variable, may indicate that the main factor influencing depopulation processes is the level of fertility. Countries where the coefficient of determination (R^2) is high also include Montenegro and North Macedonia. However, in their case, the migration factor is statistically insignificant, and high values of the intersects (−15.65 and −34.37) make the rapid reconstruction of the population of these countries relatively unlikely.

For the remaining countries, the coefficients of determination are at a very low level, which means a poor fit of the regression equations to real data and therefore renders the analysis pointless. However, this situation indicates that other factors are influencing the balance of natural movements and the populations there.

5. Conclusions

The whole area of South-Eastern Europe can be considered depopulated and rapidly demographically ageing. It is disadvantageous not only from the point of view of public spending, but also the development prospects of the countries in the region.

The analysis of the progress of the population ageing process in those countries in the years 1990–2020, in dynamic terms, showed significant differences. This progress was most intense in Albania and Bosnia and Herzegovina. Such a significant deterioration of the demographic situation of these countries partially results from changes in the family model. However, the main cause was low fertility rates. At the same time, one has to remember that changes in the size and structure of these populations have resulted not only from demographic processes occurring systematically with varying intensity. Armed conflict and war crimes against the civilian population significantly disrupted natural demographic processes in the region. These tragic events were reflected in birth rates, death rates, migration rates, etc. and in the dynamics of change.

The study showed that fertility rates should double to stop the ageing process. However, such a scenario is unrealistic due to the long-term nature of the phenomenon. Another problem deepening the process of depopulation is emigration, particularly evident in the case of Albania, Bosnia and Herzegovina, Bulgaria and Greece. Migrants are most often young people whose departure leaves a higher percentage of older people in the general population of their countries of origin and reduces the reproductive capacity of the region.

The study demonstrates that the ageing of the SEE population is a relatively homogeneous phenomenon. The population of the region has been rapidly ageing. An ongoing assessment of the demographic situation in individual areas can help identify and prevent the negative effects of this process, and adopt instruments supporting socio-economic development at the local and regional levels. The analysis of the regression equations showed that there is a variety of factors influencing the ageing process in the SEE countries.

Therefore, further research into these factors should be conducted; not only from the point of view of the progress of the ageing process, its dynamics and geographical distribution. It is worth considering different age structures of populations in urban and rural areas, which makes it necessary to conduct analyses in the urban-rural cross-section.

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