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Demographic Changes in the Countries of the Western Balkans – A Comparative Analysis with the European Union

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Abstract

The study analyses the demographic changes in five countries of the Western Balkans – Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia – which are associated with and are potential candidates for European Union (EU) member states. Due to a lack of data, Kosovo was excluded. The research was based on selected measures, both static and dynamic. The analysis was conducted against the background of the indicators presented for the EU, with the longest time sample covering the years 1960–2020. The study presents the scope of demographic changes and the advancement of the population ageing of these countries using selected static measures and showing their dynamics. The methods used are based on data analysis and cluster analysis. The results point to the advancement of demographic changes and ageing in the region. The comparison of calculated measures indicates that the demographic structure in the region has shifted towards "old", with the share of people aged 65 and over higher than 14% in 2020. The most advanced stages concern Bosnia and Herzegovina, where the transformation from a "young" demographic structure to an "old" was very dynamic and deep.

Keywords: demographic ageing, Western Balkans, demographic changes, ageing index, population aged 65 and over, cluster analysis

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Introduction

In recent years, almost all countries have experienced numerous demographic changes, including an increase in life expectancy and extended longevity. These changes affect population ageing and cause numerous socio-economic challenges for the countries experiencing them. In the European Union (EU), population ageing is advanced. While this phenomenon is analysed and assessed in detail by the European Commission for current member states, potential candidates are somewhat overlooked. In view of the Western Balkans' future membership in EU structures, although uncertain or distant, the lack of analysis to identify the demographic situation of the Balkan region regarding current EU trends may be detrimental to EU policies, especially the socio-demographic policy. The uniqueness of the Western Balkans and the determinants of demographic changes (military conflicts, ethnic conflicts, neglects in population and social policy) may be a significant challenge for the EU. Hence, it is necessary to compare and evaluate the progress in demographic changes and population ageing in the region. The comparison of the processes will make an important contribution to the literature of the subject, and this paper aims to fill the gap.

The term Western Balkans applies to six countries in Southern and Eastern Europe covered by the EU enlargement policy: Albania, Bosnia and Herzegovina, Montenegro, Kosovo, North Macedonia, and Serbia. The region has remained unstable since the wars of the 1990s, and in some cases, there are sustained conflicts or tensions between states. The problems in bilateral state relations are considered one of the critical points in the enlargement of the EU with Balkan accession (Petrovic and Wilson 2021).

The six Western Balkan countries are now at different stages of negotiations with the EU. North Macedonia applied for membership in 2004, followed by Montenegro in 2008 (accession talks began in 2012) and Albania in 2009 (but despite meeting all the EU's requirements, membership talks have not started yet). Serbia submitted its application for EU membership in 2009 (accession talks started in 2014 but were held up due to the worsening political relations with Kosovo). Meanwhile, Bosnia applied in 2016 and now is considered a potential candidate, as is Kosovo (in April 2016, the association agreement entered into force). Summing up, Bosnia and Herzegovina and Kosovo have the status of potential candidates, Albania and North Macedonia have the status of candidate countries, and accession talks have started in Serbia and Montenegro.

The empirical analysis of population ageing uses numerous measures to determine the advancement of the demographic process. Population ageing is understood as a process in which there is a noticeable increase in the number of elderly people (as a rule, people aged 65 and over) and an increase in the share of these people in the total population, with a simultaneous decrease in the number and share of people aged 0–14 years

(Holzer 2003; GUS 2014). In practice, numerous indicators are used to evaluate and describe ageing (Abramowska-Kmon 2011; Spijker 2015), including the demographic index, which is based on the share of older people (65 and over) in the total population, i.e. expressed as the following ratio $\frac{population_{65+}}{total\ population}$.

Rosset (1959) uses a similar indicator (the numerator includes people aged 60+) and proposes interpreting it as follows. Generally, society can be treated as demographically "young" if the share of 60+ is lower than 8%. If it is between 8% and 10%, then the society is in the early transition phase between "young" and "old". He considers a share between 10% and 12% to be the late transition phase, and when it is higher than 12%, it is demographic ageing. However, within demographic ageing, he distinguishes four additional phases: 12%–14%, i.e. initial, 14%–16% – moderate, 16%–18% – advanced, and 18% and higher – highly advanced.

Abramowska-Kmon (2011) points out the UN's definition, which is based on the share of people aged 65 and over in the total population. According to the UN, the population can be considered: young (the share of 65+ is less than 4%), mature (from 4% to 7%) and old (over 7%).

The literature offers many additional measures. When the "old" population is defined as the population aged 65+, then other popular indices and their formulas are: ageing index ($\frac{population_{65+}}{population_{0-14}}$), i.e. the number of people aged 65 and over per youth under 15; age dependency ratio ($\frac{population_{65+} + population_{0-14}}{population_{15-64}}$), i.e. a measure of the sum of people aged 0–14 and people aged 65 and over, compared with the total population aged 15 to 64. The indicator gives insight into the number of people of non-working age compared with the number of working-age people; young-age dependency ratio ($\frac{population_{0-14}}{population_{15-64}}$) is the ratio of the number of young people (i.e. aged 0–14) compared to the number of people of working age (i.e. 15–64 years old); old-age dependency ratio ($\frac{population_{65+}}{population_{15-64}}$) is the ratio of the number of elderly people, generally economically inactive, i.e. aged 65 and over, compared to the number of working-age people (i.e. 15–64 years old).

Regardless of the measure used, ageing impacts the economy and society in different ways, including pension systems, healthcare, the labour market, policy preferences, the welfare state and many other aspects (see, e.g. Iparraguirre 2019; Vlandas, McArthur, and Ganslmeier 2021; Razin and Schwemmer 2022).

Considering the above, the study presents the results of analysis concerning the demographic changes in the Western Balkan countries and compares them with the EU. They will allow us to assess how advanced the demographic changes of the Western Balkan are in relation to the EU, taking into account the status of these countries as associated countries and potential candidates for the EU. In particular, the study identifies trends and changes in the demographic structure of these countries and determines how advanced population ageing is.

The particular interest in the region results from these countries' potential accession to the EU. Thus, the study determines which of the analysed countries are the most similar to the EU regarding the indicators used to analyse the demographic changes and measures of advancement of ageing. It also assesses the extent to which these countries are similar to each other. A multidimensional method, cluster analysis, was applied. As a result, the methods used in the empirical parts of the study are based on the data analysis and the cluster analysis.

The study's value added is the complexity of the analysis of ageing in the Western Balkans and its comparison with the EU trend. The article fills a gap in the literature, related to the analysis of the ageing in the Western Balkans, all the more that the five Western Balkan countries are associated and potential candidates for EU membership.

A number of analyses are undertaken in this paper using static and dynamic indicators. The longest time sample includes data for the years 1960–2020. The main data sources are the World Bank's World Development Indicators (WDI) database and the United Nations Population Division (UN) data.

Demographic changes in the Balkan countries – General data analysis

This empirical section analyses the demographic processes in the Balkan region and compares the results among the five countries and with the EU average.

First, the population growth rate is analysed. Data availability allows us to analyse the time sample covering the period from 1960 to 2020. The population growth rates declined in all countries, but, generally, the decline in 2020 compared to 1960 for each analysed country was higher than the decline in the growth rate of the World's population. The generally declining trend fluctuated strongly in a few periods, which should be analysed within the history of the Balkan region. In particular, the breakup of Yugoslavia and numerous military and ethnic conflicts during the early 1990s related to this breakup should be mentioned, including the war in Croatia (1991–1995, mainly 1991–1993) or the war in Bosnia and Herzegovina (1992–1995). The conse-

quences are reflected in Figure 1 as strong negative growth rates (mainly caused by the deaths and the increased number of refugees or internally displaced).

Until the beginning of the 1990s, Albania had the highest population growth rate, but then there was a dramatic drop. In 1989, the population growth rate was 2.7%, in 1990, it was 1.8%, and in 1991, there was a decrease of –0.6% compared to 1990. The results denote a great change in population growth rate by 3.3 p.p. in 1991 compared to 1989. The sharp changes in Albabian population were associated, among others, with the dissolution of Yugoslavia, the end of communism in Europe, a civil war in the first half of 1997, and the Albanian army's involvement in the war in Kosovo (1998–1999).

In Bosnia and Herzegovina, the population growth rate in 1993 was –3.7%. From 1989 onwards, Bosnia's population decreased drastically – by approximately 772,000 between 1989 and 1997, i.e. from 4.508 million in 1989 to 3.736 million in 1997 (and from 4.508 million to 3.281 million between 1990 and 2020, i.e. by 1.23 million). This decline was related to the dissolution of Yugoslavia. In 1992 Bosnia and Herzegovina became independent. However, the launch of an independent state led to civil unrest among the different ethnic groups, resulting in the ethnic Bosnian War (1992–1995).

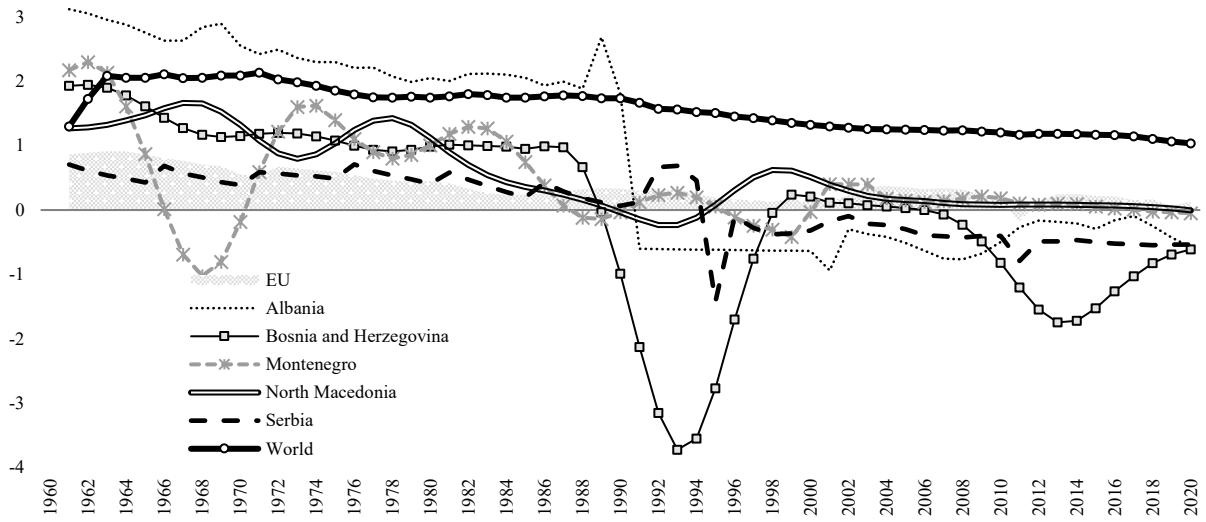

Figure 1. The growth rate of the total population in the five Balkan countries against the World and the European Union in the years 1960–2020

Source: author's own work based on World Bank (n.d.).

The next serious decline was observed at the beginning of the first decade of the 21st century. In 2013, Bosnia had the first civil census after the Bosnian War. The computed population growth rate in 2013 was negative (–1.745%), and that result was the second-highest registered decrease over the period 1960–2020, with the (already mentioned) highest negative growth rate in 1993 (–3.723%).

By contrast, since 2000, there has been quite a stable trend in the population growth rate in North Macedonia and Montenegro. Meanwhile, in Albania, there has been a small increase in the population growth rate since 2010.

An interesting observation is that since the beginning of the 2000s, the growth rate in the analysed countries was lower not only than the World's but also than the growth rate calculated for the EU. Generally, after 1995, the population growth rate in Albania and Serbia was negative. By contrast, in Bosnia and Herzegovina, it was positive between 1999 and 2006, in Montenegro, it was positive between 2001 and 2017, and in North Macedonia, it was generally positive, except for 2020, when the growth rate was –0.0037%. The change in the growth rate between 1961 and 2020 for all countries was negative, ranging from –3.7 percentage points (p.p.) in Albania (i.e. a decline from 3.12% in 1961 to –0.58% in 2020) to –1.24 p.p. in Serbia (i.e. from 0.71% in 1961 to –0.53% in 2020). By contrast, for the global population, the reduction was –0.26 p.p. (from 1.3% in 1961 to 1.04 in 2020), and for the EU, it declined by –0.74 p.p. (from 0.87% in 1961 to 0.13 in 2020).

Potential longevity is measured by the expected life. The appropriate indicators are presented in Table 1. Generally, the life expectancy at birth in the analysed countries was around 76–78 years in 2019. The highest was in Albania (78.6), and the lowest in Serbia (75.7). At the same time, the average EU citizen born in 2019 was expected to live longer (81.1). The longest expected life for women was in Albania (80.2) and in Bosnia (79.9). Between 1960 and 2019, the highest increase in life expectancy was in Bosnia. For women, it increased by 18 years, and for men by 16.2 years. The average increase in the total population was 16.2 years. At the same time, the average life expectancy of the World's population increased by 20.1 years, while for the EU, it was 12.1 years.

Table 1. Life expectancy at birth for male, female and total population, and the change in expected longevity from 1960 to 2019

		1960	1970	1980	1990	2000	2010	2019	Change 1960–2019
Albania	female	63.2	68.4	72.1	75.0	77.0	79.3	80.2	17.0
	male	61.3	65.5	68.5	69.1	71.2	74.1	77.0	15.7
	total	62.3	66.9	70.2	71.8	74.0	76.6	78.6	16.3
Bosnia and Herzegovina	female	61.9	68.2	73.0	74.3	76.9	78.5	79.9	18.0
	male	58.7	64.0	67.6	67.4	71.7	73.5	74.9	16.2
	total	60.4	66.2	70.4	70.9	74.4	76.0	77.4	17.0

		1960	1970	1980	1990	2000	2010	2019	Change 1960–2019
Montenegro	female	65.0	72.4	76.3	77.7	76.0	77.5	79.3	14.3
	male	62.5	67.3	69.6	71.3	70.5	72.8	74.4	11.9
	total	63.8	69.9	73.1	74.6	73.2	75.2	76.9	13.1
North Macedonia	female	61.1	67.4	70.5	73.2	75.8	76.7	77.8	16.7
	male	60.2	65.3	66.9	69.2	70.8	72.7	73.8	13.6
	total	60.6	66.3	68.6	71.2	73.3	74.7	75.8	15.2
Serbia	female	n.a.	n.a.	n.a.	n.a.	74.4	77.0	78.4	x
	male	n.a.	n.a.	n.a.	n.a.	68.9	71.8	73.1	x
	total	n.a.	n.a.	n.a.	n.a.	71.6	74.3	75.7	x
World	female	54.6	60.7	65.1	67.8	69.9	72.8	75.0	20.4
	male	50.7	56.6	60.8	63.3	65.4	68.4	70.6	19.9
	total	52.6	58.6	62.8	65.4	67.5	70.6	72.7	20.1
European Union	female	71.7	74.0	76.3	78.4	80.5	82.8	83.8	12.1
	male	66.5	67.9	69.4	71.2	73.8	76.7	78.4	11.9
	total	69.0	70.9	72.8	74.7	77.1	79.6	81.1	12.1

Source: author's own work based on World Bank (n.d.); n.a. denotes data not available.

The differences between the indicators for women and men living in the Balkan region were not high. For example, in 1960, in North Macedonia, the gap was 0.9 years, while in 2019, it was forecast to be four years. The largest gap in 2019 was expected for Serbia (5.3 years), while for the EU, it was 5.4 years.

The background for the analysis of demographic changes is shown in Table 2. Since the beginning of 2000, the region has been sharply affected by demographic processes. In Bosnia and Herzegovina and in Serbia, there have been low birth rates and high death rates.

Table 2. Fertility rate, birth rate and death rate in Balkan countries against the background of the World and the EU

	Albania	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia	World	EU
Fertility rate, total (births per woman)							
1960	6.49	3.80	3.60	3.84	n.a.	4.98	2.57
1970	4.91	2.93	2.74	3.16	n.a.	4.78	2.35
1980	3.62	2.12	2.24	2.49	n.a.	3.71	1.87

	Albania	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia	World	EU
1990	2.98	1.77	2.08	2.21	n.a.	3.25	1.63
2000	2.16	1.50	1.88	1.72	1.48	2.70	1.44
2010	1.66	1.32	1.76	1.47	1.40	2.52	1.57
2019	1.60	1.25	1.75	1.49	1.52	2.40	1.52
Birth rate, crude (per 1,000 people)							
1960	40.92	31.50	29.55	29.67	n.a.	31.75	18.74
1970	31.84	23.63	21.52	25.22	n.a.	32.38	16.39
1980	26.98	18.47	18.62	21.16	n.a.	27.42	13.97
1990	24.87	14.84	16.49	17.72	n.a.	25.88	12.16
2000	16.44	10.98	13.69	13.00	9.80	21.68	10.46
2010	12.00	9.26	12.51	11.11	9.40	19.81	10.45
2019	11.62	7.94	11.67	10.65	9.30	17.90	9.29
Death rate, crude (per 1,000 people)							
1960	11.33	9.66	9.90	10.58	n.a.	17.71	10.05
1970	8.00	6.95	7.35	7.45	n.a.	11.99	10.37
1980	6.29	6.28	6.74	7.19	n.a.	10.27	10.46
1990	5.99	7.71	7.16	7.55	n.a.	9.23	10.32
2000	5.91	8.29	9.75	8.30	13.80	8.59	9.95
2010	6.84	9.75	10.21	9.51	14.20	7.89	9.84
2019	8.08	10.88	10.75	10.14	14.60	7.52	10.39

Source: author's own work based on World Bank (n.d.); n.a. denotes data not available.

The Balkan region experienced a change in the death rate trend between 1980 and 2000, while the average death rate for the EU was quite stable. The dynamics of the data emphasise the faster decline in the fertility rate and birth rate in the region compared to the EU average. Comparing the last three decades with 1960 emphasizes the highest declines in fertility rate and birth rate in Bosnia and Herzegovina and in Albania. For example, in Albania, between 1960 and 2019, the fertility rate decreased by 75% and in Bosnia by 67%. Similarly, the birth rate in Albania in 2019 was lower by 72% compared to 1960, and in Bosnia by 75%. The low fertility rates emphasize the advancement of the region's natural depopulation and a very low sub-replacement rate.

The observed demographic process negatively affects the socio-economic conditions of the region, especially the labour market. The ratio of the non-working age population to the working-age population is reflected by the age-dependency ratio (see Figure 2).

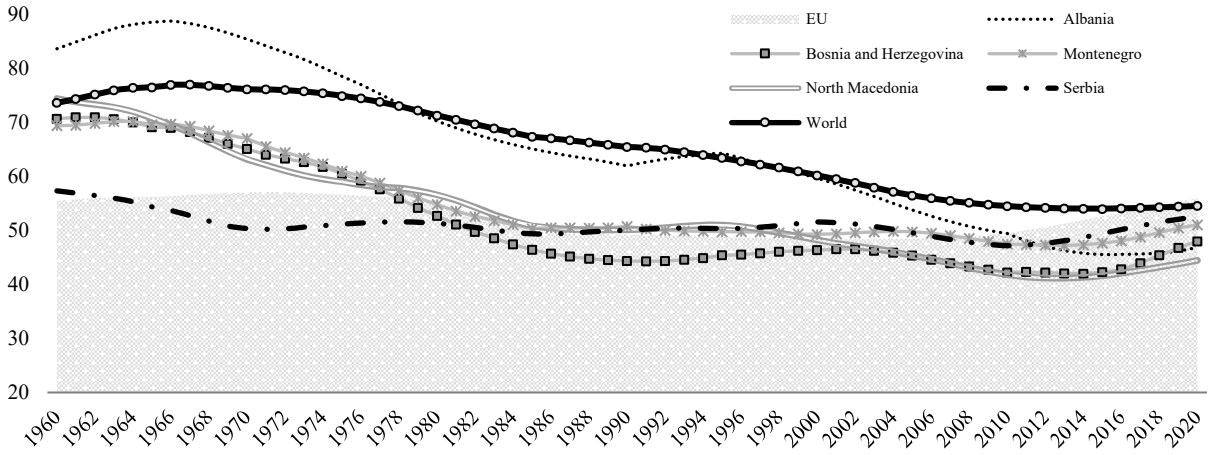

Figure 2. Age dependency ratios over 1960–2020 in Western Balkan countries against the World and the EU

Source: author's own work based on World Bank (n.d.).

The political situation and the conflicts of the 1990s shaped the formation of the age dependency ratio. Nevertheless, with the exception of Albania, the countries of the region showed a decreasing trend of the indicator, although the trend reversed at the beginning of the 2010s. For example, in Albania in 2020, on average, for every two people of working age, there was about one person of non-working age. The highest ratio of the sum of people aged 0–14 and 65+ to people of working age was in Serbia (52.5%) and Montenegro (51.1%), and the lowest was in North Macedonia (44.5%). However, at the end of the 2010s, the age-dependency ratios of the Balkan countries were lower than the EU average and lower than the world average (see Figure 2).

Additional information is given by the international migrant stock indicator – a measure of the number of people born in a country other than where they live, including refugees (UN SD 2017, p. 9). The estimates are derived from the data on people who reside in one country but were born in another. The indicators for selected years are presented in Table 3. It is worth looking at the data due to the potential effects of international migrant stock on the internal labour market.

The indicators differ greatly among the Western Balkan countries. For example, in 2019, the international migrant stock in Montenegro was 11.30% but only 1.08% in Bosnia. Albania also had a low value of the indicator, where the number of people born in another country was only 1.71%. The relatively high indicators for the EU might be a result of the free labour market for EU citizens and the ease of movement.

Table 3. International migrant stock as a percentage of the total population, selected years

	1990	1995	2000	2005	2010	2015	2019
Albania	2.01	2.29	2.45	2.10	1.79	1.80	1.71
Bosnia and Herzegovina	1.25	1.81	2.21	1.26	1.05	1.12	1.08
Montenegro	n.a.	n.a.	n.a.	n.a.	12.58	11.44	11.30
North Macedonia	4.77	5.51	6.18	6.20	6.26	6.29	6.30
Serbia	0.98	8.29	9.68	8.71	9.19	9.10	9.35
EU*	12.86	13.16	13.48	13.96	14.96	15.43	15.86

* calculated as a simple average
Source: author's own work based on United Nations data; n.a. denotes data not available.

Advancement of population ageing in the Western Balkan countries – Data analysis

Generally, the dynamics of ageing between 1960 and 2020 in the Balkan region can be analysed by a different set of indicators – both static and dynamic. Figure 3 presents the dynamics of the population aged 65 and over. The number of old people increased in Bosnia and Herzegovina by 5.3 times, whereas the global average increased by 4.8 times and in the EU by 2.7 times. Generally, the data indicate three periods of growth, with a decline in the 1980s and a decline at the beginning of 2010. The trend is generally applicable to all countries except for Albania. Figure 3 shows the disparity in dynamics between Bosnia and Herzegovina and the rest of the Balkan countries and the EU average.

Moreover, due to historical aspects, the analysis of the dynamic of the total "old" population should be extended by analysing the indicators that show the share of the old population in the total population, among others. Figure 4 shows the percentage changes of indicators for the share of the population aged 65 and over in the total population and the indicators for the share of the population aged 0–14 in the total population between 1960 and 2020.

The highest increase in the share of older people was in Bosnia and Herzegovina (by more than 420%), parallel with the highest decrease in the share of people at age 0–14 (i.e. a decrease of more than 62%). Despite this, in 2020, the lowest share of old age people was in North Macedonia and Albania, and the highest was in Serbia. In 2020, the indicator for Serbia was on a similar level to the EU average. Moreover, the percentage increase of the share of old people in Balkan countries over the last 70 years was not lower than 156% (from approximately 156% in Montenegro to more than 420% in Bosnia). Mean-

while, the percentage decline in the indicator measuring the share of young people was between 48.2% in Montenegro to nearly 62% in Bosnia and Herzegovina.

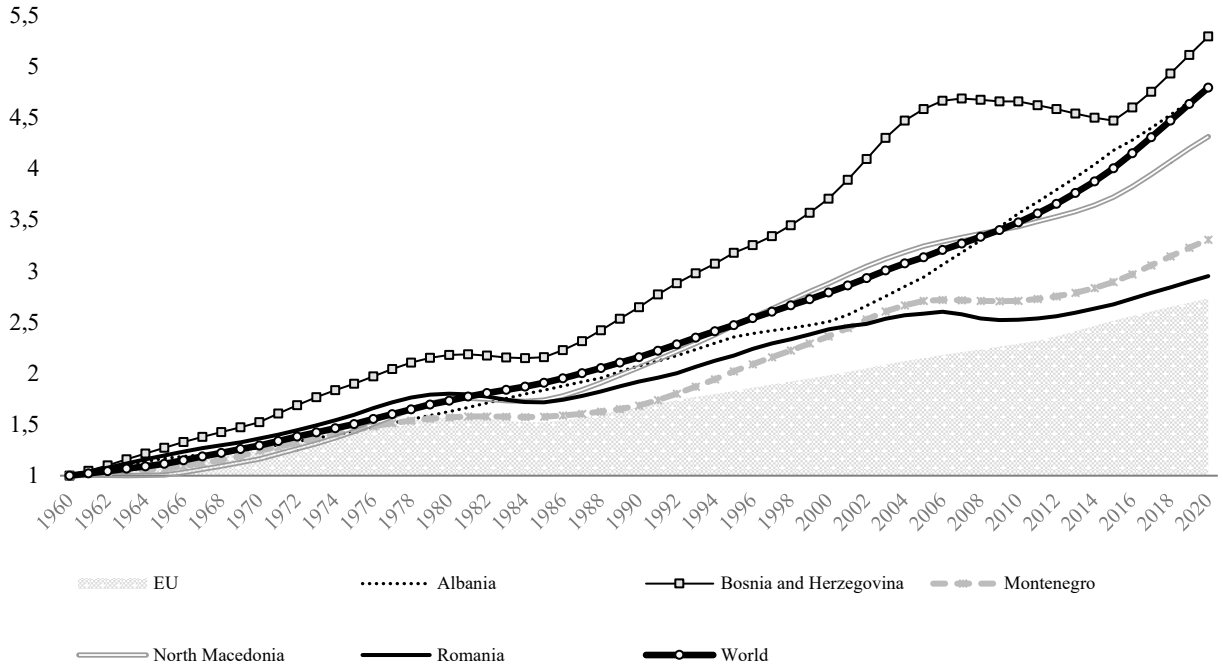

Figure 3. People aged 65 and over; the index for 1960 = 1

Source: author's own work based on World Bank (n.d.).

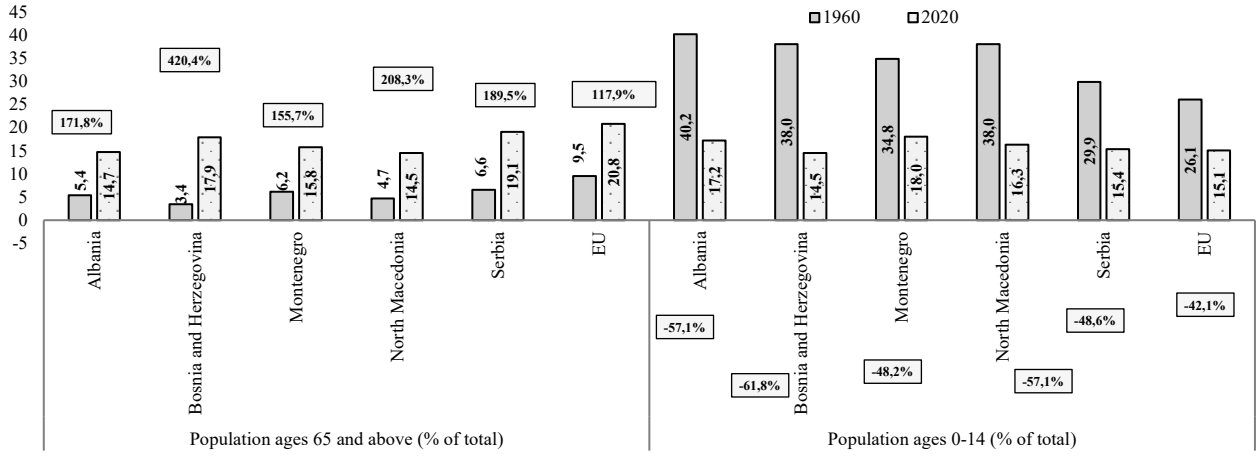

Figure 4. Share of population aged 0–14 in the total population and the share of people aged 65 and over in the total population in 1960 and 2020, and the percentage change between 1960 and 2020

Source: author's own work based on World Bank (n.d.).

The details regarding the dynamics of the two indicators are presented in Figure 5. The left panel illustrates the dynamics of the share of young people in the total popula-

tion, and the right shows the share of old people. The assumption for each index is that the value for 1960 is 1.

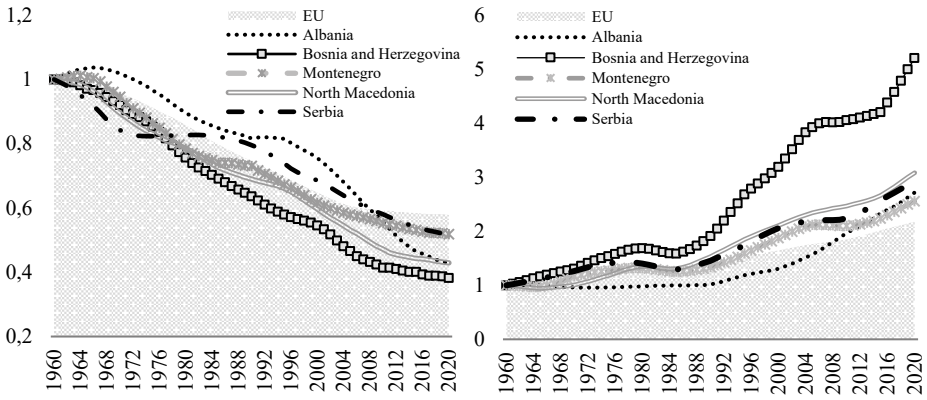

Figure 5. The dynamics of the share of the young population (left panel) and the old population (right panel) in the total population, 1960–2020; the index for 1960 = 1

Source: author's own work based on World Bank (n.d.).

The decrease in the share of the population aged 0–14 in Albania (between 1960 and 2010), Montenegro (period 1968–1990) and Serbia (1983–2008) was lower than in the EU (expressed by the highest indicator of the dynamics). In the other countries, or in the other periods, the change in the proportion was more dynamic, with the highest in Bosnia and Herzegovina. Figure 5 shows the advanced and dynamic increase in the share of people aged 65 and over in the total population, mainly since the mid-1980s. Starting in the 1990s, the Balkan countries, except for Albania, experienced higher dynamics than the EU average.

The analysis above can be supplemented with information about the old-age dependency ratio indicator, i.e. the ratio of the share of elderly (as a general, the population aged 65+) in the working-age population. Detailed data are presented in Table 4.

Table 4. The old-age dependency ratio and its dynamics in selected years, 1960–2020

Old-age dependency ratio, (% of working-age population)						
	Albania	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia	European Union
1960	9.94	5.88	10.45	8.19	10.36	14.80
1961	9.97	6.05	10.43	8.08	10.53	15.08
1970	9.64	7.43	12.03	7.71	12.52	17.84
1980	9.02	8.85	12.59	9.92	13.94	20.23
1990	8.90	9.51	12.43	10.82	14.38	20.13
2000	11.27	16.07	17.27	14.67	20.52	23.29

Old-age dependency ratio, (% of working-age population)						
	Albania	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia	European Union
2010	15.91	19.86	19.13	16.45	21.70	26.38
2020	21.61	26.52	23.83	20.92	29.06	32.40
Dynamics of the old-age dependency ratio; 1960 = 1						
1960	1.00	1.00	1.00	1.00	1.00	1.00
1961	1.00	1.03	1.00	0.99	1.02	1.02
1970	0.97	1.26	1.15	0.94	1.21	1.21
1980	0.91	1.51	1.20	1.21	1.35	1.37
1990	0.90	1.62	1.19	1.32	1.39	1.36
2000	1.13	2.73	1.65	1.79	1.98	1.57
2010	1.60	3.38	1.83	2.01	2.09	1.78
2020	2.17	4.51	2.28	2.55	2.81	2.19

Source: author's own work based on World Bank (n.d.).

Between 1990 and 2000, after a short period of a decline in the indicator (except for Serbia), there was a visible increase. In 2020, in Serbia, for almost every ten people of working age, there were three people aged 65 and over. In Albania, Montenegro and North Macedonia, for every ten working-age people, there were two "old" people. After 2000, the dynamics were fast in Bosnia. The acceleration is visible for all countries between 2000 and 2020.

Finally, the indices for ageing were calculated for the period from 1960 to 2020 for each country and for the EU as a whole, and the results for breaks of every thirty years are presented in Figure 6. The index shows the ratio of the population aged 65+ to the population aged 0–14.

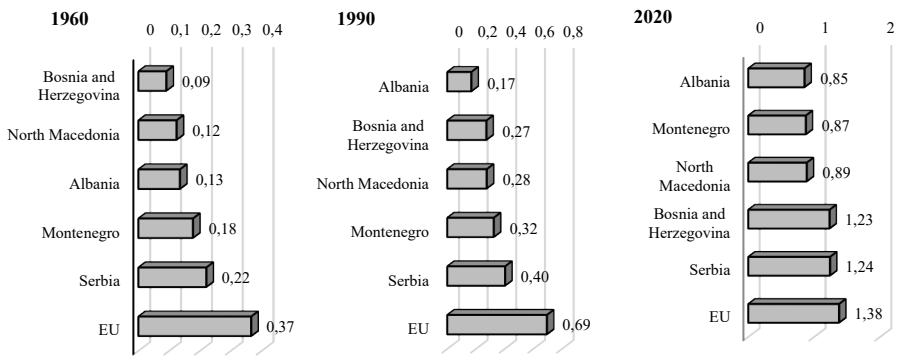

Figure 6. Ageing indices in 1960, 1990, 2020

Source: author's own work based on World Bank (n.d.).

The data show a significant increase in the index between 1960 and 2020, but the Balkan countries were below the EU average. In general, the highest indices were in Serbia except for 2006–2011, when they were slightly higher in Bosnia. Interestingly, between 1960 and 1969, the lowest computed indices were in Bosnia. Over the analysed period, it shifted its position from a generally "young" population to an ageing population. This indicates a deep change in the demographic structure of that country's population against the background of the region. From 1970 to 2020, Albania had the lowest ratio of people aged 65 and over to those aged 0–14. Between 1960 and 2020, the indicator increased by more than 3.7 times in the EU, by more than 13.6 in Bosnia, but only by 4.9 in Montenegro and 5.6 in Serbia. Figure 7 shows the indicators of dynamics of the calculated indices, presented for every ten years between 1970 and 2020 under the assumption that the value for the year 1960 equals 1.

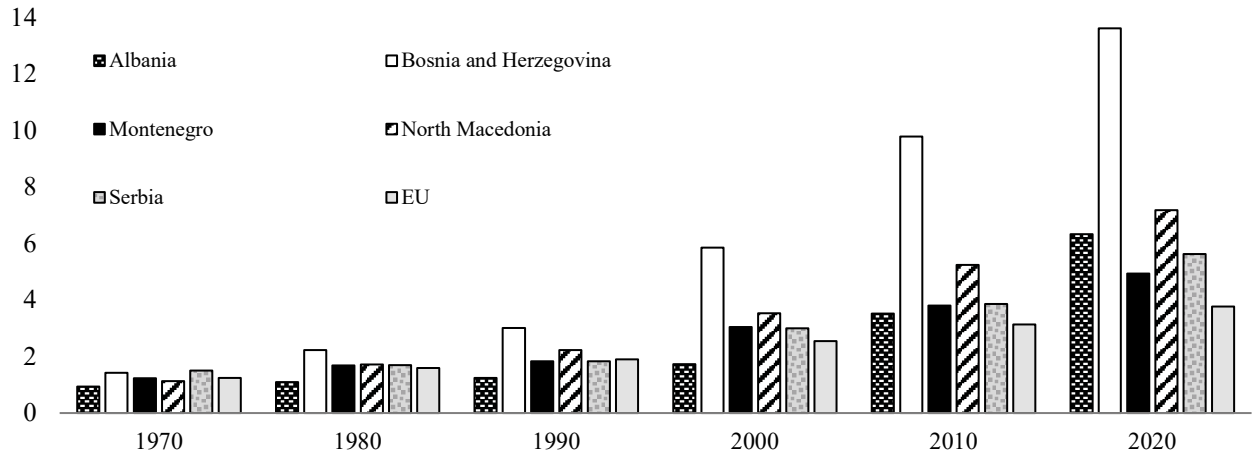

Figure 7. Changes in the ageing indices in the Balkan region against the EU, 1970–2020; the index for 1960 = 1

Source: author's own work based on World Bank (n.d.).

As Figure 7 shows, the Bosnian population was characterised by the largest dynamics of the indicator. The value of the ageing indices increased in Bosnia from 0.09 in 1960 to 1.23 in 2020, denoting a more than 13.61 times increase. The country with the second-highest dynamics was North Macedonia, where the ratio of people aged 65 and over to the population not older than 15 increased from 0.18 to 0.87 over that period. This is shown in Figure 7 by an increase of more than 7.18 times, while in the EU, it was 3.77 times.

Empirical comparison – The cluster analysis

In this part of the study, the results of using the hierarchical method of grouping objects – the cluster analysis – are shown. The algorithm makes it possible to analyse the similarity between objects (countries) from the point of view of the set of chosen variables. Cluster analysis is based on the distance between objects (see Bernstein, Garbin, and Teng 1988; Bailey 1994). In general, the greater the distance between objects, the lower the level of similarity. The most popular metric applied in cluster analysis is the Euclidean metric (Kaufman and Rousseeuw 2005; Everitt et al. 2011), which is represented by the formula:

$$d_{ij} = \sqrt{\sum_{i=1}^{p} (x_{ik} - x_{jk})^2}$$

where x_{ik} and x_{jk} are the k-*th* variable value of the p-dimensional observations for individuals *i* and *j*, respectively (Everitt et al. 2011).

In the applied cluster analysis, Ward's method (1963) is employed to measure the proximity between groups of individuals. In this method, the change in distance between clusters is defined as an increase in the sum of squares within the clusters (Romesburg 2004; Kaufman and Rousseeuw 2005). The advantage of Ward's method is that it is generally used with (squared) Euclidean distances (Sarstedt and Mooi 2014). Cluster analysis based on Ward's method is considered effective, although it tends to create small-sized clusters (Stanisz 2007).

In this study, the initial set of variables includes:

X_1 – population aged 0–14 (% of total population);

X_2 – population aged 65 and over (% of total population);

X_3 – ageing index;

X_4 – age dependency ratio (% of working-age population);

X_5 – fertility rate, total (births per woman);

X_6 – birth rate, crude (per 1,000 people);

X_7 – death rate, crude (per 1,000 people);

X_8 – old-age dependency ratio (% of working-age population);

X_9 – international migrant stock (% of the total population).

Due to missing data for the death rate, birth rate, fertility rate and international migrant stock in 2020, the last observation concerns the year 2019. Additionally,

the lack of data for Serbia for the period 1960–1994 and for the international migrant stock for Montenegro means that the final time sample is limited. The lack of data leads to difficulties comparing long-trend demographic changes over the available short time span. As a result, the cluster analysis is employed only for 2019. The data used come from WDI and the UN.

The condition of each of the countries and the EU, expressed by the set of chosen variables $X_1 - X_9$, is presented only for 2019. Selected descriptive statistics for that year are presented in Table 1A in the Appendix. The list of potential indicators is analysed from the point of view of their informative features. It is important that the set of variables used should be characterized by not high correlation (see Table 2A in the Appendix for a correlation matrix). The data should also be characterized by an appropriate level of variability (see Zeliaś 2004). Thus, the decision was made to reduce the list of variables.

As a result, the final list of indicators used includes:

- 1st set:

X_6 – birth rate, crude (per 1,000 people);

X_7 – death rate, crude (per 1,000 people);

X_8 – age dependency ratio, old (% of working-age population);

X_9 – international migrant stock (% of the total population).

- Or 2nd set:

X_3 – ageing index;

X_5 – fertility rate, total (births per woman);

X_7 – death rate, crude (per 1,000 people);

X_9 – international migrant stock (% of the total population).

The use of two lists of indicators makes it possible to compare whether the change in a set of demographic variables affects the similarity of the countries to the EU. Consequently, it checks the robustness.

The headline indicator, the index for the share of the population aged 65 and over in the total population, was excluded from further analysis due to high collinearity with another set of variables. Finally, before the cluster analysis, the variables were standardised. Based on the standardised variables, the distances between objects were calculated. The computed values allow for an initial assessment of the (dis)similarity of the analysed countries (see, e.g. Zeliaś 2004) to the EU average from the point of view of chosen variables. The results from the clustering algorithm are presented in Table 5.

Table 5. Matrices of Euclidean distances between objects in 2019 in cluster analysis

	Albania	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia	EU
2019 – variables in 1st set						
Albania	0.00	2.98	2.16	1.42	4.08	3.96
Bosnia and Herzegovina	2.98	0.00	3.12	2.35	2.56	3.10
Montenegro	2.16	3.12	0.00	1.31	2.71	2.62
North Macedonia	1.42	2.35	1.31	0.00	2.98	3.18
Serbia	4.08	2.56	2.71	2.98	0.00	2.40
EU	3.96	3.10	2.62	3.18	2.40	0.00
2019 – variables in 2nd set						
Albania	0.00	2.95	2.30	1.44	3.79	3.61
Bosnia and Herzegovina	2.95	0.00	3.82	2.22	2.82	3.18
Montenegro	2.30	3.82	0.00	1.85	2.81	2.73
North Macedonia	1.44	2.22	1.85	0.00	2.66	2.74
Serbia	3.79	2.82	2.81	2.66	0.00	2.38
EU	3.61	3.18	2.73	2.74	2.38	0.00

Source: author's own work.

The algorithm used as a linking method within the cluster analysis gives the output as a dendrogram. The dendrograms for the cluster analysis for both sets of variables are presented in Figure 8. Using cluster analysis, it is possible to divide objects into the smallest groups of similar objects.

The results of the cluster analysis were interpreted in two ways: 1) do the Balkan countries differ from the EU average, and 2) how similar are these countries to each other.

The assessment of the similarity of the five analysed Balkan countries to the EU average shows that Serbia is the most similar, regardless of the set of demographic variables. In 2nd set, Serbia is still the most similar to the EU, but its similarity is slightly higher than in 1st set, as shown by the shorter distance between these two objects. In 1st set, Albania differs significantly from the EU and the other Balkan countries, but in 2nd set, its distance to the EU is shorter.

The results also allow us to divide the countries into clusters. Considering the distances and linkages, the proposition is to divide the dendrograms into two clusters in both sets of variables. In each case, the structure of clusters is as follows: (1) the EU, Serbia, Bosnia and Herzegovina, (2) North Macedonia, Montenegro and Albania.

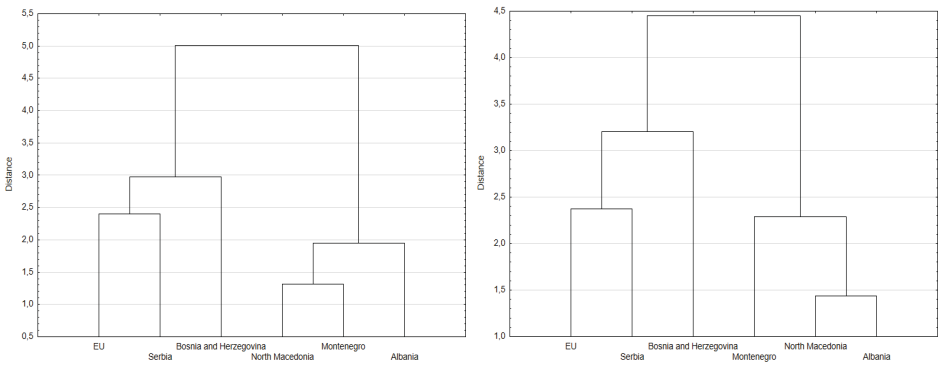

Figure 8. Results of cluster analysis for 2019 and two sets of demographic variables (1st set – left panel, 2nd set – right panel)

Source: author's own work.

Detailed analysis of the value of the variables among objects inside the two clusters reveals that in 1st set, the countries incorporated into the first cluster had the lowest birth rates in 2019 but one of the highest death rates. It also had the highest old-age dependency ratios, i.e. it includes objects with quite an old demographic structure. By contrast, the second cluster had the lowest death rate and a relatively low old-age dependency ratio.

For 2nd set, the division into two "blocks" meant that cluster (1) was formed by objects with the lowest fertility rates and relatively high ageing index, i.e. objects with an ageing structure of society. The opposite was true for cluster (2), which had the highest fertility rate in 2019, and the lowest ageing index.

Conclusions

The study aimed to identify and present the most important demographic changes in the countries of the Western Balkans. These changes were also considered against the background of the EU due to the status of these countries associated and potential candidates for EU membership.

The main conclusions of the study may be formulated as follows. The countries are at an advanced stage of demographic changes. While the analysis of static indicators shows that the average size of demographic changes in the EU is stronger than in the Western Balkans, the measures of dynamics indicate a more advanced pace in the Western Balkans, especially in Serbia or Bosnia. Both countries were also the most similar countries to the EU in terms of selected static demographic indicators in 2019, regardless of the set of variables used.

In this study, the advancement of old age is shown by, among others, an index of the share of people aged 65 and over in the total population, which in 2020 was

above 14% in these countries. Adopting the UN definition, these countries should therefore be considered to have an "old" demographic structure. The fertility rate in these countries was low, generally below 2, especially in Bosnia (1.25 in 2019), while in the EU, it was 1.52. This affects natural depopulation and problems replacing generations. The ageing index also shows that the population structures in Western Balkans are ageing. In 2020, in Serbia and Bosnia, the ratios of people aged 65 and over to people aged under 15 were higher than 1.

The demographic processes were strongly associated with the region's history, especially many ethnic or civil conflicts, including military conflicts, the dissolution of Yugoslavia, and periods of intense emigration and very low immigration to the Balkan region. Additionally, the migration policy in these countries was not clear or well-regulated. It affects problems with data availability and the quality of the demographic data. The ageing of the Balkan population also depends on factors including an increase in life expectancy (between 1960 and 2020, the increase was higher than in the EU) and a constantly declining birth rate.

As outlined by the scientific goal of the study, the research shows the advancement of demographic processes in the Western Balkans. The processes were compared to the EU average. Based on the selected demographic indicators, the results imply that in 2019, the EU was most similar to Serbia and most different to Albania. The results of the similarity analysis show that the five countries were a heterogeneous group. The cluster analysis for 2019 shows that the distance between the group that comprises Serbia and Bosnia and the group with Montenegro, Albania and North Macedonia was quite large, indicating dissimilarity.

The comparison of calculated measures indicates that the demographic structure in the Western Balkans has become "old", with an increasing share of people aged 65 and over in recent decades. The analysis clearly demonstrates the advancement of ageing in Bosnia. Considering the processes between 1960 and 2020, it can be indicated that Bosnia experienced the most advanced changes in population ageing. Meanwhile, the reproductive capacity of its population in 2019 was the lowest. The empirical evidence of the research is an important step towards better understanding how population ageing might affect government policies. The consequences of the changes, without any or with insufficient support from the government or the EU, may be serious for the country and the region.

In the Western Balkans, as in the EU, the balance between retired people (old-age population) and those of working age has been worsening, leading to a shrinking labour supply (base of taxpayers) and causing problems with financing pensions of the increasing number of elderly. Another implication is related to the conclusion that ageing, parallel to economic effects, also involves many social consequences and affects other areas of public space (e.g. longer life requires medical care and creates demand for other public services). However, the preparation and readiness of the region to accede to the EU

may influence some areas of public policies in these countries, mainly aimed at pro-natal issues or migration policy, potentially mitigating severe demographic changes.

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Zmiany demograficzne w krajach Bałkanów Zachodnich – analiza porównawcza z Unią Europejską

Celem podjętego badania jest przedstawienie wyników analizy dotyczącej zmian demograficznych w pięciu krajach Bałkanów Zachodnich, będących tzw. krajami stowarzyszonymi i potencjalnymi kandydatami do członkostwa w Unii Europejskiej. Badania oparto na wybranych miernikach zmian demograficznych, zarówno statycznych, jak i dynamicznych. Analizy te zaprezentowano na tle wskaźników dla Unii Europejskiej, przy czym najdłuższa próba czasowa obejmowała lata 1960–2020. Ze względu na brak większości danych dla Kosowa, w badaniu uwzględniono pięć z sześciu krajów regionu: Albanię, Bośnię i Hercegowinę, Czarnogórę, Macedonię Północną oraz Serbię. W opracowaniu przedstawiono zakres zmian demograficznych i stopień zaawansowania starzenia się ludności tych krajów, posługując się wybranymi miarami statycznymi i ukazując ich dynamikę. Uzyskane wyniki podkreślają zaawansowanie zmian demograficznych i starzenia się ludności w regionie. Porównanie mierników wskazuje na szybką transformację struktury demograficznej w regionie w kierunku „starzejącej się" ze wskaźnikiem udziału osób w wieku 65 i więcej w populacji ogółem przekraczającym 14% w 2020 roku. Najbardziej zaawansowane procesy dotyczyły Bośni i Hercegowiny, gdzie transformacja od „młodej" struktury demograficznej do „starej" była bardzo dynamiczna i głęboka.

Słowa kluczowe: demograficzne starzenie się, Bałkany Zachodnie, zmiany demograficzne, indeks starości demograficznej, ludność w wieku 65 lat i więcej, analiza skupień

Appendix

Table 1A. Selected descriptive statistics

	Obs.	Average	Median	Min	Max	Range	Variance	St. dev.	Coef. of variation
X_1	6	16.22	15.97	14.69	18.15	3.46	1.82	1.35	8.33
X_2	6	16.68	16.30	14.09	20.46	6.37	6.67	2.58	15.48
X_3	6	1.04	1.01	0.82	1.35	0.54	0.05	0.23	21.95
X_4	6	49.14	48.65	43.84	55.36	11.52	18.32	4.28	8.71
X_5	6	1.52	1.52	1.25	1.75	0.49	0.03	0.16	10.58
X_6	6	10.08	9.98	7.94	11.67	3.73	2.21	1.49	14.75
X_7	6	10.81	10.57	8.08	14.60	6.52	4.49	2.12	19.60
X_8	6	24.95	24.21	20.26	31.77	11.51	20.40	4.52	18.10
X_9	6	7.60	7.82	1.08	15.86	14.78	32.79	5.73	75.35

Source: author's own work based on World Bank (n.d.) and United Nations data (n.d.).

Table 2A. Correlation matrix

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
X_1	1.000								
X_2	−0.698	1.000							
X_3	−0.853	0.969	1.000						
X_4	−0.246	0.866	0.715	1.000					
X_5	0.854	−0.256	−0.485	0.253	1.000				
X_6	0.961	−0.681	−0.829	−0.244	0.862	1.000			
X_7	−0.396	0.542	0.516	0.445	−0.130	−0.473	1.000		
X_8	−0.640	0.997	0.946	0.902	−0.179	−0.620	0.530	1.000	
X_9	−0.006	0.604	0.437	0.823	0.474	0.050	0.321	0.655	1.000

Source: author's own work based on World Bank (n.d.) and United Nations data (n.d.).