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TYPES OF DEMOGRAPHIC EVOLUTION IN THE MICROSTATES

Abstract: In the twentieth century, changes in the population number of microstates were very diversified. It is possible, however, to observe similarities in population changes. On the basis of the following two criteria a typology of population changes was developed, i.e. the population growth rate and the variability coefficient of the population growth rate. Five types of population changes were singled out: from countries with a very small population growth and a small variability coefficient to those characterised by very large values of both of the discussed criteria.

Key words: demography, microstate, population.

INTRODUCTION

Microstates are the world's smallest countries. Borders separating them from other countries were set by dividing all the countries of the world into quintiles according to the population number and the area of the country. Microstates, in reference to the population number, have been defined as countries belonging to the first quintile and in reference to their area, to the first and second quintiles. In accordance with these definitions, there are 37 microstates in the world, located in all parts of the world. The greatest number of microstates is located in Oceania and in the Caribbean and the smallest number in Asia.

In the twentieth century, the population of microstates underwent a great many changes. In particular states, changes occurred with diversified intensity, in different directions and at different times. In the beginning of the twentieth century, over 1.8 million people inhabited 36 microstates. However, in the year 2000, there were almost 7.3 million inhabitants. Therefore, the population number increased by 3.9 times, i.e. somewhat faster than the population of the entire world (3.8 times) (Holzer, 2003, p. 119). The greatest increase of the population took place in the years 1990–2000 and the smallest during the years 1910–1920. Changes in the population number in

time in particular microstates were very divers. However, similarities in population changes may be observed.

TYPOLOGICAL CRITERIA

Due to incomplete data on natural movement and migration, the thematic scope of the typological criteria was limited to changes in the population number. Two characteristics were selected. The first is the growth rate showing how many times the population number changed in the examined time period. The second variable should characterize the variability of the population growth or decrease in time.

In the fifties, by using two criteria, A. Geddens developed the typology of population changes. They are the growth rate and the coefficient of variability changes developed by him. The first is calculated on the basis of the formula

$$I = (L_n / L_o) \cdot C,$$

where L_n is the population number after n years, L_o is the population number at the beginning of the examined period, C is constant, usually 100. The second, however, determines to what degree the curve of the real population growth diverges from the line which represents a uniform population growth (the mean growth rate for the entire period). This coefficient is calculated on the basis of the formula

$$V = [\,(1/n\,\Sigma\,|L_i - L'_i\,|\,) / L_{śr}\,] \cdot C,$$

where n is the number of the examined sub-periods i, L_i is the real population in the examined sub-period, L'_i is the hypothetical population in the examined sub-period, assuming an even change rate, $L_{śr}$ is the mean population number in the examined period, and C is constant, usually 100 (Jędrzejczyk D., 2001, p. 138).

Despite numerous merits of the typology proposed by A. Geddensa, its application turned out to be impossible due to a strong correlation between the discussed characteristics. The Pearson correlation coefficient between these two indexes was 0.77. Therefore, it was necessary to look for a different criterion or more than one different criteria.

It was decided to keep the growth rate and look for another method of presenting the population growth variability. It seemed that the A. Geddensa coefficient of variability changes may be substituted by the variability coefficient of the population growth rate. It shows how different was the population number change rate in each of the microstates in every decade. It is calculated on the basis of the formula

$$V = s/x_{śr},$$

where s indicates the standard deviation and $x_{śr}$ is the arithmetic mean (Łomnicki A., 1999, p. 45-46). The Pearson correlation coefficient between

the growth rate and the coefficient of the variability change rate was 0.43. Therefore, the selection of typological variables meets the weak correlation condition between typological variables. Both typological variables for all the microstates are presented in table 1.

Table. 1.

Population growth rate (PGR) and variability coefficient of the population growth rate (VC)

Microstate	PGR	VC	Microstate	PGR	VC
Andorra	12.7	32.0	Malta	2.1	4.7
Antigua and Barbuda	2.2	10.5	Marshall Islands	4.1	17.1
The Bahamas	5.7	13.5	Monaco	2.1	8.9
Bahrain	10.0	15.1	Nauru	8.5	24.6
Barbados	1.5	5.9	Niue	0.5	16.4
Belize	6.5	7.7	Palau	5.0	43.9
Brunei	18.6	13.1	Qatar	58.1	28.0
Cape Verde	2.9	15.6	Samoa	5.3	11.5
Comors	6.7	13.5	San Marino	2.8	8.1
Cook Islands	2.3	9.6	São Tomé and Principe	3.2	10.0
Dominica	2.7	5.3	Seychelles	4.2	5.1
Equatorial Guinea	3.3	10.5	Solomon Islands	4.9	14.2
Federated States of Micronesia	8.3	18.3	St. Kitts and Nevis	1.0	15.0
Grenada	1.3	6.3	St. Lucia	3.1	4.8
Kiribati	3.0	8.5	St. Vincent and the Grenadines	2.8	5.3
Liechtenstein	3.3	8.7	Tonga	4.9	9.9
Luxembourg	1.8	5.1	Tuvalu	2.7	9.4
Maldives	5.8	12.4	Vanuatu	3.0	18.3

Source: own elaboration on the basis of statistical data sources listed in References

TYPOLOGICAL PROCEDURE

There are many methods of examining similarities between units, e.g. coefficients of distance, association and correlation. It was decided to use the first method because of its simplicity and the possibility of presenting the calculations results on a graph.

The classic taxonomic distance index was used. For two-dimensional Euclidic space it is expressed by the formula

$$d_{ij} = [(x_i - x_j)^2+(y_i - y_j)^2]^{1/2}$$

where x_i, x_j is the first typological variable of points i and j and y_i, y_j is the second typological variable of points i and j. The smaller the distance value, the greater is the similarity of units (Chojnicki Z., Czyż T., 1973, p. 37). The examined countries were presented on a graph where the axis of abscissae (X-axis) indicates the population growth index values and the axis

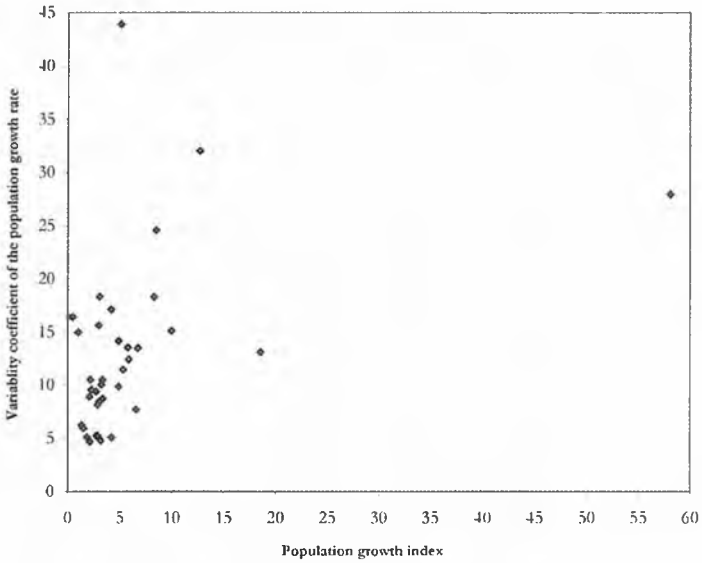

Fig. 1. The population growth index in relation to the variability coefficient of the population growth rate

of ordinates (Y-axis) is the variability coefficient of the population growth rate.

To differentiate the types, an elementary grouping method was selected because it takes under consideration reciprocal distances of all elements of the ordered set and not, as in hierarchical grouping, the strongest interlinkage between units. The application of the first method rules out including in whatever type, units which are very distant from one another.

In this typology, it was established that one type will be made up of those microstates between which distance is less than 3 or 4. The first value refers to those countries whose variability coefficient was less than 13 and the second value refers to those which were characterised by the variability coefficient greater than 13. In the process of selecting these values, the decisive factor was that, on the one hand, as many countries as possible be included in particular groups and on the other, that the types be separable. The justification for accepting two border values was the fact that the greater the values of the typological variables, the greater their taxonomic distance.

TYPES OF POPULATION CHANGES

Thus, five population changes were identified. To increase the legibility of the graph showing the types of microstates, four countries, which were not classified in any of the types, were eliminated (Andorra, Qatar, Nauru, Palau).

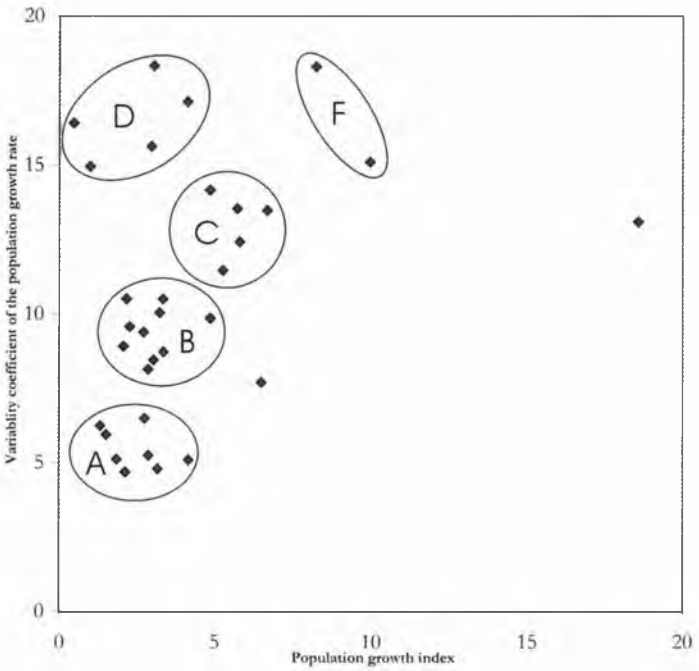

Fig. 2. Types of population changes in the microstates

Type A comprises countries which are characterised by a small population growth (from 1 to 4 times) and a very small variability of the growth index (about 5). The following seven countries are included in this type: Barbados, Dominica, Luxembourg, Malta, Seychelles, St. Lucia, St. Vincent and Grenadines.

Type B comprises countries whose population has increased slightly (from 2 to 5 times) and the variability index reached small values (about 9). These are the following ten countries: Antigua and Barbuda, Cook Islands, Equatorial Guinea, Kiribati, Liechtenstein, Monaco, San Marino, Tonga, Tuvalu, São Tomé and Principe.

Among **type C** are countries which population increased by about six times and the variability index is about 13, i.e. has reached the mean values. Such typological variability values characterise the following five countries: The Bahamas, Comoros, Maldives, Samoa, Solomon Islands.

Type D comprises countries where population either increased or decreased several times. What differentiates these countries is a large variability index, e.g. about 16. In determining this type, a greater border value of 4 was accepted. The following five countries are in this group: Cape Verde, Niue, St. Kitts and Nevis, Marshall Islands, Vanuatu.

The final, **type E**, comprises countries which are characterised by a large growth index (about 9) as well as by a large variability index (about 17).

Also in this case, a greater borderline value was accepted. Two countries are in this type, e.g. Bahrain and the Federated States of Micronesia.

None of the following seven countries are included in the type categories discussed above: Andorra, Belize, Brunei, Grenada, Qatar, Nauru and Palau. Some of them resemble one of the identified types. Grenada is very close to type A. It is removed by more than 3 from only one country in this group. Therefore, it seems reasonable to include it in this type. A similar case, however less unequivocal, is Belize. On the graph, it is located between three types (A, B, C). The shortest average distance separates it from type B. The distance between Belize and any of the countries in the group does not surpass 6 and only in four cases is less than 4 and in one, less than 3.

The remaining five microstates are characterised by a very large growth or variability index. Even though distance between these five countries is much greater than the accepted borderline values, it is certain that they share very large typological variance values.

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