



BIRTH DYNAMICS IN THE PERIOD 1990–2020. ROMANIAN PERSPECTIVES IN A MULTISCALE CONTEXT

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The decline in the birth rate is one of the major current challenges for Romania. Along with sustained emigration, partly temporary but with serious effects on reproductive health, it implies a continuous restriction of the workforce potential. In the context of the accentuation of the aging process, major structural imbalances are caused which can endanger the socio-economic stability. The desire to ensure sustainable demographic development, although often claimed, is not accompanied by a long-term strategy capable of reducing the negative effects of the demographic shock installed after the fall of the communist regime. In this sense, the present study proposes a descriptive analysis of the evolution of the birth rate at multiscale level (global, European, national), doubled by a factorial analysis that tries to capture some of the factors that contribute to creating deep disparities at national level. The complex causality of the birth rate captures, beyond the effects of the evolution of the redistribution and restructuring of the population during the communist period, the importance of geographical factors (relative position to urban centers), cultural (presence of conservative communities) or economic (adaptation to market economy). The conclusions of the study converge on the idea that the current situation requires the coupling of policies to stop the demographic decline with sustainable development policies, taking into account local particularities that require specific measures.

Ke words: birth rate decline, disparities, causality, demographic resilience, Romania.

INTRODUCTION

The issue of birth rate has been a constant concern among specialists in human population. The generalization of the demographic transition, a complex process as a result of which the components of the population natural balance pass from high to low values, in close connection with the socio-economic and cultural modernization, imposed special attention to its final phase, in which demographic deficit can be reached, as a result of the combination of a low birth rate and a higher and higher life expectancy (Lee, 2003). If the situation of Germany, the first state which experienced natural deficit (in peacetime) starting with the year 1972, has long seemed singular, in the last three decades, following the “shock” of the fall of communist regimes in Central and Eastern Europe, there has been a generalization of the phenomenon at the continental level, with recent

expansions in Eastern Asia as well. Stopping the decline in birth rates through demographic policies is not a certainty, their results being rather inconsistent, thus imposing an active ageing policy (Walker, Maltby, 2012).

If there are cases of countries that have avoided demographic decline by relaunching their birth rates (such as Sweden, Denmark etc.), this has also happened due to their massive openness to quite diverse immigration flows (Kulu, 2005). Birth rate recovery seems to be closely linked to economic recovery (Luci, Thévenon, 2011); not coincidentally, the Eastern European states which have managed to ensure a balance between births and deaths are the most advanced ones (the Czech Republic and Slovenia for example). Our country has had a shortage of births since 1992 and there is no hope that the situation will improve in the medium term, on the contrary. The effect of the massive emigration of the young population has eroded any possibility of counteracting the decline in birth rate

through family support policies (Roman, Voicu, 2010). Its recovery is not possible in the absence of some stable female cohorts, as evidenced by the situation of more advanced states (Hellstrand *et al.*, 2019). Or, in Romania, it has experienced a steady decline in recent decades, either if we refer to the permanent resident population or, more correctly, to the usually resident one (Figure 1).

Under these circumstances, the reduction of the spectrum of the natural decline of the population can only be based on the increase in the life expectancy at birth (infant mortality has already reached a relatively low level but overall mortality rate is still high in the European context) and on stimulating the increase in birth rates up to a level as close as possible to an acceptable level of the total fertility rate (2.1). For this purpose, young families should become the target group of some real support policies, consisting in facilities related to raising and educating children, housing and quality of life etc.

Birth recovery in Romania can only be an expression of resilience, of the ability to return to a state of equilibrium, absolutely necessary after the “demographic shock” that occurred in the early 1990s. The disruptive dysfunctions it produced have brought about an increasing vulnerability, supplemented by vectors such as the mass emigration, the risk of poverty or economic crises. Demographic resilience is an essential component of social resilience (the ability of government institutions and agencies to deal with crises), given the cyclical nature of specific developments (Capdevila *et al.*, 2020).

From a human-geographical perspective, *eight types of vulnerability* can be identified (Wisner, 2009): *economic* (lack of access to basic resources); *social* (disintegration of traditional social models); *ecological* (voluntary / involuntary degradation of the environment and its reduced protection capacity); *organizational* (absence of effective land management institutions); *attitudinal-motivational* (weak public interest in these risks); *political* (lack of representativeness, vitiated by corruption and democratic deficit); *cultural* (persistence of anachronistic traditions and beliefs); *physical* (poor construction and service infrastructure). Only by mastering these forms of vulnerability can we achieve demographic resilience, which is a component of that social balance necessary for sustainable development (Kubacki *et al.*, 2020). Even a brief analysis of human-geographical vulnerability, as previously set out, indicates a number of major shortcomings in our country. As a result of the above-mentioned demographic shock, two key trends can be identified: one of *resistance* and one of *temporary disruption*. In the first case, we can talk about the adaptation of the demographic system to the current situation, keeping its previous balance; in the second case, we can talk about either resilience or vulnerability, as it adapts to the new situation or it remains captive to perpetuating disruptive factors (Palekiene *et al.*, 2015). The Romanian case falls into this state of constant disturbance which excludes, for the moment, recovery, renewal or reorientation (Figure 2).

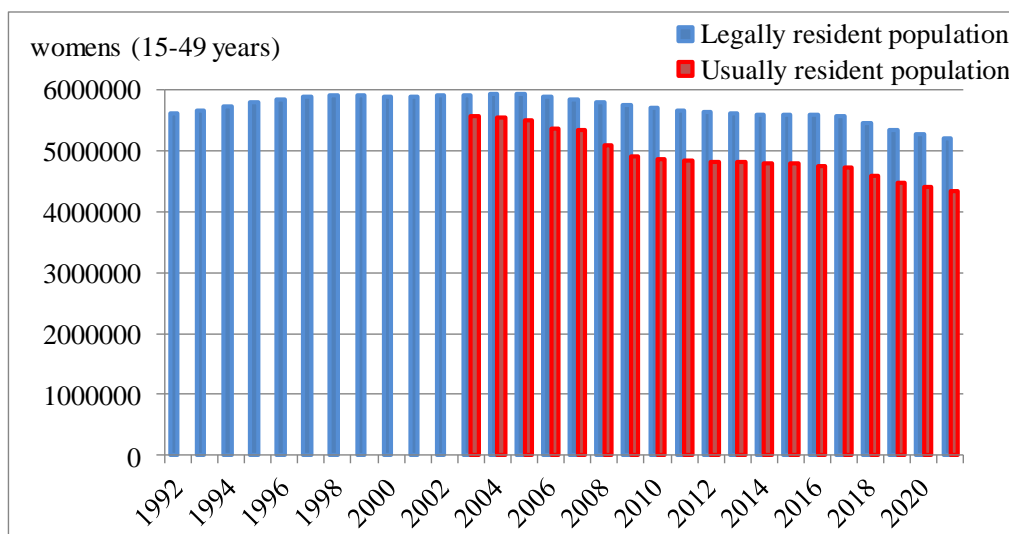


Figure 1. Dynamics of fertile female population (aged 15-49) between 1992 and 2020.

Data source: National Institute of Statistics, Tempo Online Database.

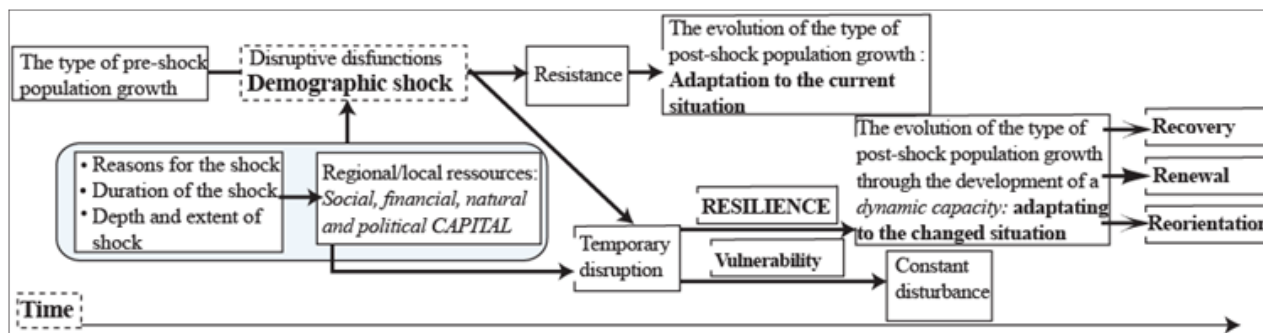


Figure 2. Framework of regional resilience from a demographic perspective.
(Adapted after Martin, 2002; Palekiene, Simanaviciene, Bruneckiene, 2015)

The duration, depth and temporal extent of the shock, manifested throughout the whole Eastern Europe and, to a lesser extent, including in the west of the continent, is co-dependent on the specificities of the resources each country disposes of (specific capital). The exposure to shock risk was uneven, vulnerability being primarily derived from the inequitable access to resources (Morrow, 2008). The way in which factors such as poverty, minority status, gender, age, precarious education, poor technological training or low social capital have manifested themselves is extremely variable. In general, social vulnerability reduces the access to resources and information, involves a *reduced capacity to absorb major shocks*, hence the constant disruption of the dynamic balance. The European countries with a high level of socio-economic development are affected by a vulnerability induced by the combination of declining birth rates and demographic ageing (Strack *et al.*, 2008). The decrease of the work capacity, doubled by the unprecedented increase of the educational-formative level (over-qualification of the labour force) also explains not only the labour force deficit but also the sometimes high unemployment rate (Biagi, Lucifora, 2008). Resilience (adaptation), in this case, was most often reduced to covering the demographic deficit through immigration, a mechanism that created a rift between attractive European states that have recovered their demographic evolution and those that have become providers of immigrants, such as Romania. As a consequence, the demographic vulnerability brought about by the shock produced after the fall of the communist regimes not only persists, but gets deeper, especially in peripheral, underdeveloped areas. The possibility that the economic transition, as well as the demographic one, will follow the South European scenario, as a result of which formerly migrant providers have become strong recipients (Italy, Spain) seems unlikely at present (Incalțărău, Simionov, 2017).

The human-geographical vision of the problems generated by such evolutions stands out through its territorial dimension and attention paid to spatial differentiations, disparities or the manifestation of strongly regionalized tendencies. From this point of view, the scale of analysis becomes very important. The evolution of a phenomenon with a continuous manifestation (as it is the case of the birth rate) is closely dependent on the size of the analysed territory. Certain trends, thresholds of manifestation and disturbances can only be observed on a fine territorial scale and it is for this reason that contemporary human geography favours multiscale analyses (Marston, 2000). In this way, specific elements can be extracted, guiding the application of territorialized measures, adapted to the local context.

MEANS AND METHODS

The theoretical considerations set out above represent the basis for a *multiscale analysis* of the evolution of the birth rate in order to specify, as fully as possible, the specificities of our country. The central element of the study is, therefore, *the gross birth rate* expressed in promilles. The first part comprises a descriptive analysis performed at world, European and national level, using the agglomerative hierarchical clustering model (AHC, ascending hierarchical classification) proposed by XLSTAT (produced by Addinsoft, <https://www.xlstat.com/>) as a basis for some typologies that highlight distinct evolution trends. The second part includes several *principal component analyses* (PCA) doubled by multiple linear regressions, partially based on the *partial square regression* method (PLS). These multivariate analyses were applied to a set of factors considered as representative of the evolution of the birth rate in the national context, being operated in the same program.

Thus, several databases were set up, as follows:

a) The evolution of the birth rate at world level, taking into account a number of 224 countries and territories. The information was primarily provided by the sources of the *Population Reference Bureau* (www.prb.org), summarized annually in the *World Population Data Sheet* publication. All issues published between 1990 and 2021 were consulted. In order to fill some statistical information gaps, alternative sources were consulted: the *Demographics of Europe portal* (www.demographics), hosted by Wikipedia, which collects a wide variety of demographic information at national level, indicating the source, used to compare or supplement the information on the components of the general balance; the website of the official European Statistical Office, *Eurostat* (www.eurostat.eu); the websites of the *national statistical institutions* that provide thematic databases on population development. The same sources were used to follow the evolution of the birth rate at European level;

b) The evolution of the birth rate at national level, using as a territorial base the 3,181 basic administrative units (communes, cities, municipalities), the information being taken from the *Tempo Online* database of the National Institute of Statistics, taking into account the administrative changes after 1990. The analysed information used three decades (1990–2019) as a reference period. The establishment of classes, including in the case of the typologies performed world level, used *the Euclidean distance* as a parameter and *the Ward method* as an agglomeration criterion in order to reduce the risk of class concatenation, aiming at shaping classes with a minimum internal dispersion of values. The identified types were mapped with the help of Adobe Illustrator CS 12, using an own cartographic support;

c) The factorial database, using the same territorial level (the 3,181 territorial administrative units), necessary to process the principal component analyses and multiple regressions. This includes data on the evolution of the birth rate, considered as a *dependent variable*. The analysis was broken down into three distinct periods: 1990–1999; 2000–2009; 2010–2019. Demographic, social, cultural, economic and life quality indicators were taken into account as *explanatory variables*:

– *the general fertility rate of the female population* (aged 15–49), the average values for each period, expressed in per thousand, data processed from Tempo Online (FG);

– *the migration balance*, estimated for each period, expressed in per thousand, using Tempo Online (SM);

– *the share of the emigrant population*, as revealed by the 2002 and 2011 censuses, taken into account only for the last two periods (EM);

– *the share of the elderly population*, the average values for each period, expressed as a percentage, data processed from Tempo Online (VS);

– *the share of the population employed in agriculture*, according to the 1992, 2002 censuses and the Tempo Online database (AG);

– *the share of the Roma population*, according to the 1992, 2002 and 2011 censuses (RR);

– *the share of the population with secondary and higher education*, according to the 1992, 2002 and 2011 censuses (ST);

– *the estimated level of income*, by reference to the average salary specific to the three sectors of activity (primary, secondary, tertiary), according to the socio-professional structure recorded by the 1992, 2002 censuses and the Tempo-Online database (VN);

– *newly completed homes*, their number for each period, relative to the average population, according to the Tempo-Online database (LN);

– *the level of urbanistic facilities* expressed by the average share of households with access to three basic indicators (water supply, sewerage and central heating), according to the 2002 and 2011 censuses (DE);

– *the access to the communication infrastructure*, expressed in factor scores ranging from 1 (European roads + railways) to 0.1 (communal roads), depending on the direct access to road categories (national, county, communal) (IC);

– *the position within the settlement network*, expressed in factor scores ranging from 1 (large and medium-sized cities) to 0.1 (deeply rural, communes located more than 45 km away from the nearest town) (PZ).

All the information in the factorial database was standardized using the *z-score*, removing outliers. For the synthetic expression of the results, the correlation matrix, the arrangement of the variables in the factorial plane and the regression coefficient R_2 were retained.

RESULTS AND DISCUSSIONS

INTERNATIONAL AND EUROPEAN CONTEXT

The processing of the database on the evolution of the birth rate at world level, according to the mentioned methodology, for the period 1990–2019, allowed the identification of 10 distinct patterns of evolution, grouped according to the stage reached within the demographic transition. In order to avoid

the inherent variations, AHC operated with five-year averages (1990–1994, 1995–1999, etc.), the evolution trends being more clearly highlighted.

The first group consists of four types which comprise most countries in sub-Saharan Africa, as well as several Asian or Latin American states (Figure 3). All of them stand out through a vigorous birth rate, usually over 25‰, a level high enough to allow a consistent increase in population in the contemporary context of the general decline in global mortality (its values only isolatedly exceed 10‰). However, there are significant differences between the four types in terms of spatial distribution or evolution trend during the study period (1990–2020).

Type 1 covers two distinct areas, one in Western Africa (the countries of the Sahel) and one in Central and Southern Africa, as well as two states marked by several decades of conflicts (Somalia, in the Horn of Africa and Afghanistan, in Southern Asia). In these states, the *decline in the birth rate has grown deeper only since the year 2000*, starting from a very high level, close to 50‰ (the maximum level of potential birth rate). The gap in relation to the mortality transition, obvious even before 1990, is explainable in the context of the demographic transition theory, the recent evolution of these countries confirming the universality of the model (Muntele, 2008). The last country to still record values of over 50‰, which used to be common in the 1960s and 1970s in most of Africa, Niger, has also seen a significant drop in birth rates in recent years, with a huge potential for growth in one of the most fragile natural contexts (Sahel).

Type 2 comprises states in the west and east of the African continent, in continuity with those of type 1, plus Madagascar and, in the extreme south of the Arabian Peninsula, Yemen. Close to the level of the previous type, this group of countries has experienced a *much faster decline in birth rates*, from average values of over 45‰ down to 30‰. This sharp decline can be imputable not only to a relative socio-economic and cultural modernization, but also to demographic control policies (the use of either traditional or modern contraceptive methods being much more widespread than in the case of the previous type, Blackstone *et al.*, 2017).

Type 3 includes countries that experienced a significant decline in birth rates before 1990 but have entered a phase of saturation in recent decades, failing to drop below the 30‰ threshold. Currently, the birth rate is similar to that specific to type 2, this situation demonstrating the existence of some limits imposed by the precarious level of socio-economic development, specific to all African states and

causing a certain demographic conservatism among social categories (Shapiro, 2015). The countries which belong to this type coagulate the areas formed by the other two types, practically covering almost the whole of sub-Saharan Africa, with the exception of the extreme south. In the rest of the world, the only states that fall into this category lie in Oceania (especially Papua New Guinea).

The 4th type completes this group, bringing together those countries which, starting from a level similar to type 3, experienced a quasi-linear decrease in the birth rate, down to values of 25‰. Scattered in Asia (Pakistan, Iraq, Nepal, Laos, etc.), Latin America (Bolivia, Guatemala, etc.) and less often in Africa (Namibia), this group of states, although burdened by poor economic development, have made progress in combating factors that previously maintained a high birth rate (infant mortality, illiteracy, etc.). Although in their area they may seem “backward” in terms of declining birth rates, the steady decline recorded in recent decades emphasizes a faster passage to the more advanced stages of the demographic transition, favoured by sustained urbanization, emigration and changes in family structure (Bongaarts, 2009).

The second group comprises 4 other types that include states which were close to the world average in the early 1990s (25‰). Preferably located in Latin America, Asia and northern Africa, this group includes the most backward European states in terms of completing their demographic transition (Albania, Kosovo). As in the case of the previous group, the location and specificities of the evolution trends quite clearly separate the 4 types.

Thus, *type 5*, widespread primarily in Central Asia and some Arab states (Algeria, Egypt, Oman, Syria), exceptionally in Latin America (Nicaragua, Paraguay) or southern Africa (Botswana), stands out through its changed evolution trend after the year 2000, in the sense of a significant increase in the birth rate, with an obvious stabilization tendency towards the end. For example, in Kazakhstan, the values rose from 15.6‰ in the years 2000–2005 up to 22.8‰ between 2010 and 2015, similar situations being typical of the other states in the group. This timing of the birth transition can be explained through particular situations. In Central Asia, the de-Sovietization accompanied by the massive departure of the Russian-speaking population facing the final stage of the transition and the revitalization of the Muslim religious identity lead to an increase in the fertility indicators. Somewhat similar is the

situation of some Arab states which had experienced a rapid transition but which changed their pace following the assumption of Islamist regimes (Algeria, Tunisia, Egypt, etc.). In other cases, the relaunch is recurrent to a strong immigration (Oman) or to a recovery after a major epidemiological crisis (the case of Botswana, severely affected by AIDS). The structural effect of preserving a numerous fertile female population combined with some conservative tendencies can also be taken into account, as well as the failure of inconsistent family planning policies (Ouaddah-Bedidin, Vallin, 2012).

Type 6, scattered in Latin America, Asia and northern Africa, includes some of the most populous countries on the planet (India, Indonesia, Mexico, etc.). With an evolution identical to the previous type until after the year 2000, it preserves its declining birth rates, down to values close to or significantly lower than the world average (20% between 2015 and 2020). The access of these states to the last phase of the transition is certain, the potential for population growth being significantly diminished. They are usually countries which have early integrated demographic control policies into government practices, although success has not always been the one expected in the past. However, the effects of these policies, accumulated over time, have been fruitful, supported by the

progress made in improving the status of women, observed for a long time (Mason, 1987). The potential for population growth still remains quite high even with such an evolution.

Type 7 practically followed a parallel evolution to the previous one, comprising those states which registered a rapid transition in the 1980s and 1990s, thus managing to get out of the spectrum of the “demographic explosion”. This includes emerging countries such as Brazil, Turkey and Malaysia, as well as states that have had strict population growth control policies, such as Iran or Myanmar. In all of them, the socio-economic modernization doubled by the increase of the degree of urbanization and of the educational level, further explains the tendency of the birth rates to get close to the specific situation of the developed states (Potter *et al.*, 2002). In all these countries, the level of the total fertility rate has fallen in recent years below the generation replacement (2.1), shaping the premises for limiting the natural growth of the population, especially where the ageing process seems to have started (e.g. in Turkey and Brazil the share of the population over the age of 65 has increased from 4.5% in 1990 to 9.5% in 2020), which is somewhat similar to the demographic context of the eastern European countries between 1960 and 1990.

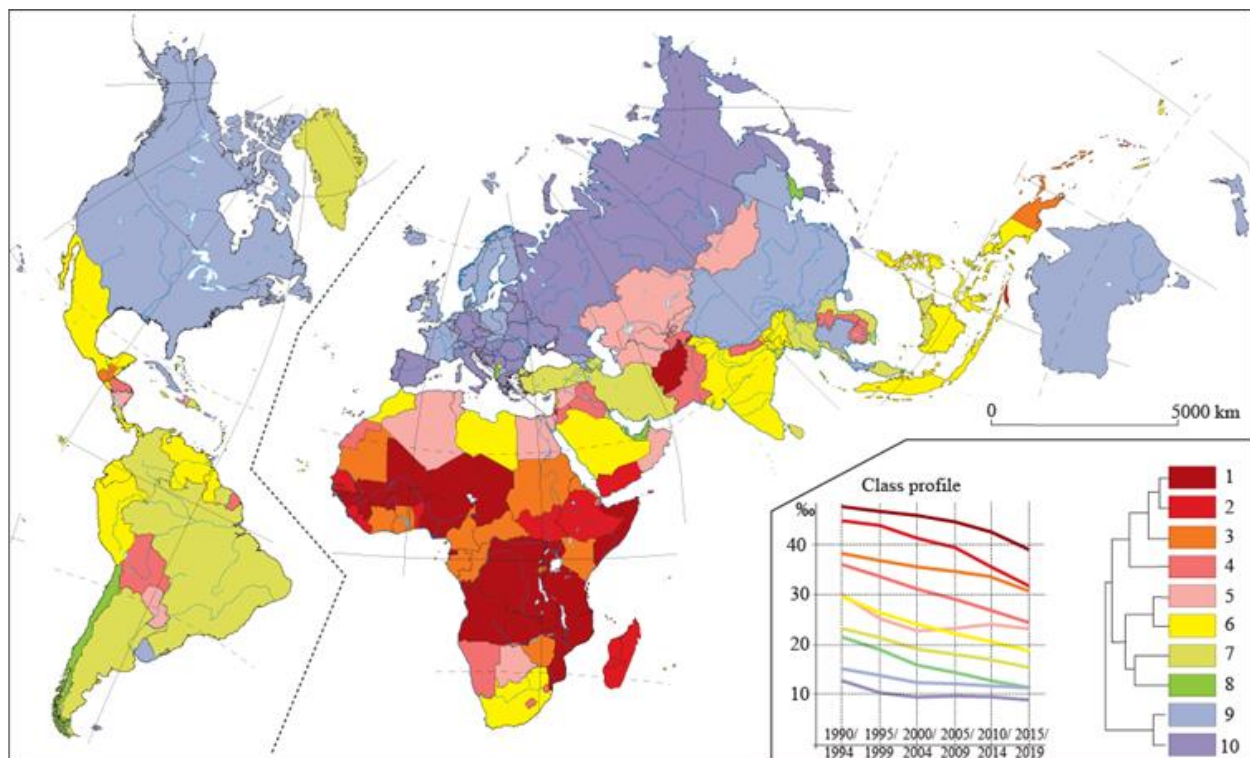


Figure 3. Typology of the world dynamics of birth rate.

(Data source: World Population Data Sheet, 1990–2021 editions, Population Reference Bureau, Washington, www.prb.org).

In the case of *type 8*, the last in this group, we can speak of a trend similar to the previous type, but accelerated after the year 2000 against the background of a strong economic development. Several countries which are less important from a demographic perspective (Chile, the Arab states of the Persian Gulf) fall into this pattern. In the case of others (*e.g.* Albania), the amplification of the declining birth rate reflects the demographic shock produced throughout the region after the fall of the communist regimes. The rapidly decreasing birth rates have led to a faster rise in the ageing process (in Chile, for example, the share of the population over the age of 65 has increased from 5 to 12% during the same period of time). As in the case of the previous type, we can speak of an influence of the strong social polarization that led to the development of a pattern of bimodal fertility evolution, with a large number of unplanned early births and an increase in the average age at first birth among educated women. This type of evolution was also experienced by developed countries in the past, but in these states it is much more obvious (Everton *et al.*, 2018). These last two types have certainly reached their last phase of demographic transition, which they will soon overcome, most likely aligning with the evolution trends specific to developed countries.

The latter group comprises two types that extend uniformly in the northern hemisphere of the planet, covering most of Europe and North America, as well as some states in eastern and south-eastern Asia and Oceania (Australia and New Zealand) or, isolated, in Latin America (Uruguay, Puerto Rico, Cuba). The differences between the two types are minor but still obvious. *Type 9*, characteristic of North America, north-western Europe and eastern Asia, stands out through a certain stability of its values, after a slight decline manifested in the 1990s, barely exceeding the threshold of 10%. In the western states, this can also be explained by the importance of the migration contribution, which delays the decline of the birth rate, maintaining a stable contingent of fertile women, even if the total fertility rate remains below 2.1 (Coleman, 2006). *Type 10*, specific to central, eastern and southern Europe, but also to Japan or South Korea, is distinguished by the massive decline in the birth rate, especially after 1990, down to extremely low values (South Korea represents the extreme case, with values of only 5.3‰ in 2020, corresponding to a total fertility rate of only 0.83). In the case of

many eastern European states (including in Romania) the demographic crisis is exacerbated by the massive emigration of young people. Even countries which have become preferential destinations for international migration in recent decades (such as Italy, Spain or Germany), are sinking into this crisis, failing to meet the birth rate level required to compensate for the natural deficit (in 2020 Italy recorded a birth rate of only 6.8‰ and a total fertility rate of 1.24, so that Romania, with values of 9.2‰ and 1.59 respectively may seem to be in a less serious situation). The prolongation of the study period, the massive presence of women on the labour market, the increase in the average age at marriage, postponement of birth, etc. are often brought forth to explain this critical situation, although it has occurred in all developed countries (Kohler *et al.*, 2006).

The position of our country, therefore, in this global context marked by a general decline in birth rates, is extremely unfavourable. Type 10, to which it belongs, groups the most vulnerable states from the perspective of the ageing process; so that not even the most optimistic projection can indicate the stabilization of the population decline (the most optimistic forecasts reveal a decrease of the population down to 16.2 million inhabitants in 2050, according to World Population Data Sheet 2002). At the moment, for the countries in this group, the key issue is to identify the mechanisms that can lead to a recovery in the birth rate, so as to result in a stabilization of the number of births in order to mitigate or even eliminate the ageing process at the base of the age pyramid. At the same time, the countries with a strong emigration (such as Romania) imperatively need a policy of preservation of their labour force potential by limiting migration or even by becoming an attractive recipient, in order to compensate for the increasing ageing process by losing the active population. In this way, birth stimulation policies are indestructibly linked to the policies of efficient use of labour resources, unconsciously abandoned to the mirage of a better life abroad, although Romania has all the natural and human premises to provide a sustainable future to its citizens.

NATIONAL CONTEXT

Using similar information, for the same period (1990–2019), the typological analysis of the evolution of the birth rate in Romania, having as a

territorial basis the 3.181 basic administrative units (communes, cities, municipalities), highlights a relative diversity, less obvious than at world level but sufficient to induce strong regional differentiations. Subsequent to the statistical validation tests that aimed at keeping an as low as possible dispersion of values within each class, eight types were selected, sufficiently clearly expressed by a distinct evolution profile. In order to avoid the variability of the birth rate from one year to another, 6 statistical series of five-year averages were used. The national average aligned the eastern European pattern of evolution, described in the previous subchapter, decreasing continuously from 11.4 ‰ in 1990–1995 and stabilizing at 9.1–9.2‰ in the last decade. A drop by only 2‰ in three decades may seem low, but it must be taken into account that during this period the population of Romania has decreased considerably, so that the decline in the birth rate in absolute values has been much more obvious (269,429 births on average for the years 1990–1994 and 209,696 for 2015–2019, according to INS). The decrease is even more dramatic if we consider the values of the last years of the communist period (373,680 births on average for 1985–1989). Compared to these average values, the 8 types have experienced a compliant evolution, strong variations or a relative stability, depending on the local specificity (Figures 4, 5). The first two types have had a more special evolution, in contrast with the national average, the other six falling in 2 groups depending on their initial positioning, with a positive or negative deviation from the average.

Type 1, the most eccentric one, provokes discussions both due to its main dispersion in certain areas (southeast and northwest of Transylvania, Moldavia, less often in the south of the country) and to its special profile. While the other types have registered a slower or faster decrease in the birth rate after 1990, in this case there was an often strong recovery, having as a starting point values which are much higher than the average. It is only in recent years that this trend has abated, the 53 communes preserving unusually high values for a European state. The presence of some minority communities (especially Roma, but also Ukrainians, in the northeast of Maramureş County or neo-Protestant communities), can most often be invoked as an explanation. The question

that can be raised is why other similar communities have complied with the national evolution trends. How can one explain the complete changed trends after 1990, given that previously, although still recording very high values, they experienced a steady decline in values, in line with the national evolution? For example, the commune of Slobozia Bradului, which in 1990–1994 had an average value of 27.4‰, faced a spectacular recovery, up to values of 39.9‰ in the years 2010–2014, the subsequent decrease still placing it above the initial level (33.6‰). Equally spectacular developments were recorded in Bărbuleşti (Ialomiţa County), Cojasca (Dâmboviţa County), Brăhăşeşti (Galaţi County), and Voitinel (Suceava County), Augustin and Budila (Braşov County), Vâlcele (Covasna) and so on.

The combination of the predominantly Roma population and the massive adherence to neo-Protestant cults (especially Pentecostal) can be regarded as an easy explanation for this evolution marked by a rising specific demographic conservatism (Muntele, Horea-Şerban, 2011). Certain predominantly Romanian or Ukrainian communities converted to these cults, especially located in northern counties (such as Suceava and Maramureş), have also experienced a recovery of their birth rates, on a slightly smaller scale, but according to the same typology. However, there are situations in which, although the share of the Roma population is equally high, against the background of the same tendency to adopt a neo-Protestant cult, the dynamics of the birth rate has not been the same (the communes of Mica and Brateiu in Mureş county or Tâmbioeşti in Vrancea county e.g.). This explains some local disparities, possibly related to the general level of education, to the openness to non-agricultural activities, etc. In these communities, the issue of births should not be raised in the sense of stimulating it but rather of controlling the explosive growth of the population, with undesirable social effects (increasing poverty, high level of illiteracy among children, etc.). The strong population growth, practically at a level similar to that of the sub-Saharan African states, requires such a specific policy (for example, the population of Bărbuleşti commune increased from 3,753 inhabitants in 1992 to 7,979 in 2020, that of Slobozia Bradului commune from 4,713 to 9,273 during the same period, in the context in which the population of Romania massively decreased).

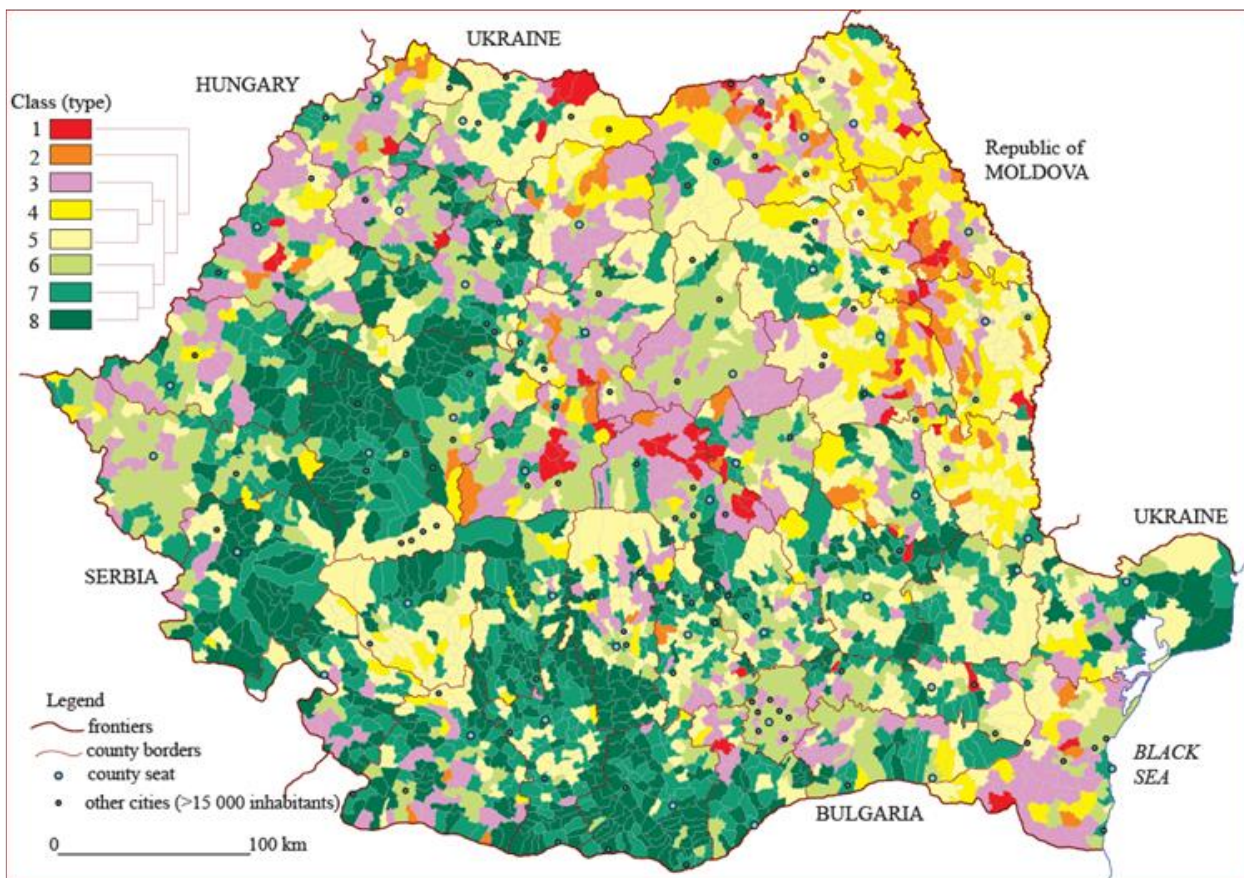


Figure 4. Typology of the dynamics of birth rate in Romania (1990–2020). Data source: Tempo Online, INS Database.

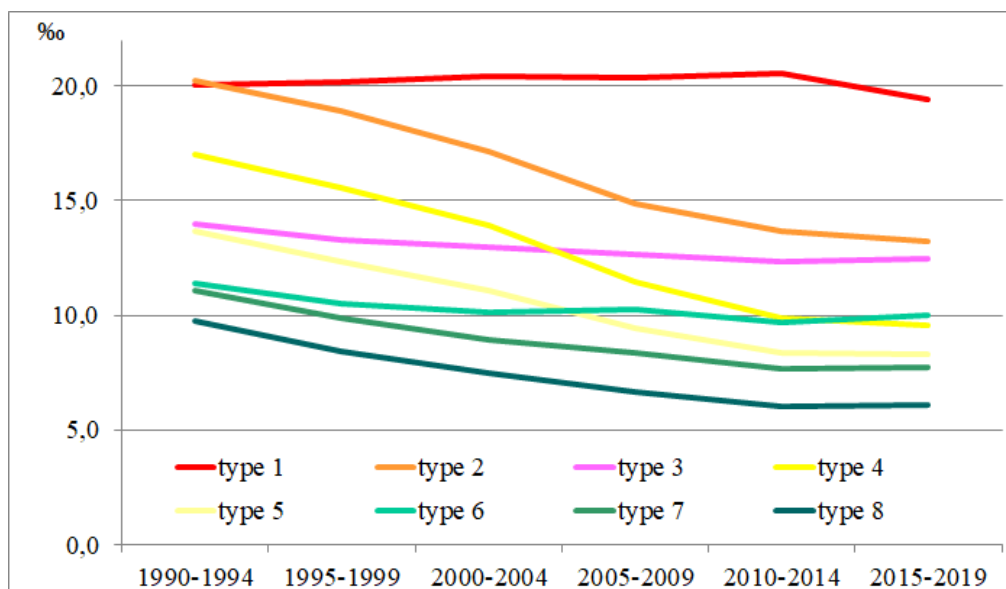


Figure 5. Profile of types of birth rate dynamics (Source: see Figure 5).

Type 2 often associates communes which neighbour those in type 1, as a possible effect of a spatial autocorrelation. It is typical of a larger number of administrative units (94), scattered in the same regions. Starting from initially very high values, similar to type 1 and after opposing some

resistance in the years 1990–2000, it experienced a rapid decline, getting closer to the national average. Despite this fall, the birth rate is still well above the average. The decline occurred mainly between the years 2000 and 2010, gradually reaching stabilization, as a result of maintaining a

larger number of the young population belonging to the generations born in the 1990s. It is possible that the differences from the previous type are caused by a stronger insertion in migration circuits, either domestic or international, as is the case of some communes such as Marginea (Suceava county) or Feldru (Bistrița-Năsăud county), studied from this point of view (Larionescu, 2012).

Types 3, 4 and 5 form a distinct group, characterized by their initial positioning above the national average values, as an expression of maintaining their previous demographic potential, including the influence exerted by the reversal of the rural exodus in the 1990s, when a significant part of those who had previously left for cities were forced to return to their rural areas of origin, amid the deindustrialization induced by the adjustment of the economic system to the rigors of the free market. The first of the three types is the most divergent one, showing a quasi-stagnation of the birth rate at values ranging from 14 to 12‰, significantly higher than the national average. Much more widespread (463 administrative units), forming compact areas in certain regions of Transylvania or southern Dobruja, this type expresses a certain resilience to the new socio-economic context, either if we refer to settlements which are favourably located in the proximity of some dynamic urban centres, or if we invoke demographic conservatism in the case of the most isolated ones.

Types 4 and 5 are distinguished by the rapid decline in the birth rate, from relatively high values (compared to the Romanian context) to much lower ones, significantly below the national average in the case of type 5. In the case of type 4 (389 administrative units), the decrease was really steep, from an initial average of 17‰ to only 9‰. This type is remarkably dominant in Moldavia, in the other areas of the country being present only isolated. Type 5 (717 cases, the most common of all) experienced a similar evolution, with a lower starting point (13.5‰) and an even more obvious degradation of the demographic potential (only 8‰ at the end of the period). Just like the previous one, it is massively present in Moldavia, but it is also well represented in Maramureș, the sub-Carpathian area of Lesser and Greater Wallachia, etc. This rapid decline in birth rates, especially visible after the year 2000, can be linked to the massive (temporary or permanent) emigration, mediated by facilitating the access to the European labour market since the pre-accession period (Muntele,

Iațu, 2008). In some cases, the decline has been massive, especially in the communes with a Catholic population in the central part of Moldavia (for example, Liuzi-Călugăra, Bacău County evolved from 19.2‰ between 1990 and 1994 to 5.5‰ between 2015 and 2019). The circumscribed areas, generally more densely populated and often with less agricultural land or specialized in resource exploitation (as is the case of the mountainous and sub-Carpathian areas) could not retain the population surplus generated by stopping or limiting the rural exodus immediately after 1990. In the absence of some local opportunities, labour emigration has become the only viable option. There are also particular situations, as for example in the south of Moldavia or in Bărăgan, where the appearance of large agricultural exploitations massively competed with the small peasant property refund to former owners following the application of law 18/1991. Devitalized, the areas belonging to these types will find it difficult to imagine solutions in order to avoid the deep population ageing process, already installed and working as a preamble of the depopulation process.

The last three types reveal the different faces of out of phase evolution, starting from values below the national average, as an expression of the earlier completion of the demographic transition but also of the untimely manifestation of the rural exodus, as was the case of the southwest and west of the country as a whole, where most cases are concentrated. Recording close shares (465, 585 and 520 cases, respectively), types 6, 7 and 8 have long been the expression of a demographic devitalization, triggered by the mentioned processes. With a precociously ageing population, with concrete manifestations of depopulation, especially in the area of the Western Carpathians, the vast arc that begins in the vicinity of the capital extending southwest along the Danube and then completely covering the Western Carpathians and ending in the Someș Plateau, north of Cluj, is the most problematic area in terms of demographic balance at the national level (Muntele *et al.*, 2021). However, these three types display distinct contexts, depending on how serious their situation is. Just like type 3, type 6 experienced a relative stability of birth rates (with variations from 11.2 ‰ initially to 9.8 ‰ towards the end). In the case of some suburban areas (Timișoara, Arad, Alba Iulia, Bucharest), this resistance can be explained by the positive migration balance that permanently

refreshed the population structure. In other cases, we can mention the ethnic specificity (the case of Covasna and especially Harghita counties), as well as a certain isolation doubled by a minimum demographic conservatism. This stabilization of the decline of the birth rate provides a new demographic balance. The most dynamic urban centres (such as Bucharest, Cluj, Timișoara or Iași) are also integrated in this pattern of evolution. After their integration into the economic circuits of globalization, their regained attractiveness is largely responsible for this evolution. In the 1990s, the decline in the birth rate was abrupt in all major cities, which were among the few settlements that later managed to regain the former level recorded at the end of the communist period (Figure 6).

Types 7 and 8 had similar evolution trends, marked by a relatively sharp decline, stabilized towards the end of the period. They stand out primarily through the gravity of their situation. Together they form vast areas that cover almost entirely some of the counties which are most affected by the demographic crisis (Hunedoara and Caraș-Severin in the west of the country or Teleorman in the south). Smaller nuclei can also be found in the southeast of the country (inland Bărăgan, the Danube Delta) and isolated in the north-east. Type 7 is rather located in the proximity of urban centres or along major transport routes, this positional advantage providing it with a minimum of resistance. Type 8 is rather typical of deeply rural areas (inland Apuseni Mountains, Poiana Ruscăi Mountains) but is also present in the immediate vicinity of some important urban

centres (Reșița, Alexandria). These two types also include most major cities (municipalities) in the country (as, for example, Craiova, Galați, Constanța, Brașov), which have failed to get back to the level recorded in the early 1990s.

The typology presented highlights the existence of some regional models of evolution, which express features derived from the specific way in which the demographic transition emerged and developed within the Romanian space, earlier and slower in the southwest of the country, later and faster in the northeast. Some types may already correspond to the manifestation of the second demographic transition (types 3 and 6), others are rapidly crossing the last phase of the classical model (2, 3, 4 and 5), but diminishing their chance of recovery as a result of the massive erosion of the population structure. In the case of the last two types, the completion of the transition is certain, but the insertion of a *second demographic transition* type of evolution is unlikely. Moreover, this type of evolution is contradictory in Romania, where the low level of fertility is not correlated with major changes in the traditional system of family values (Rotariu, 2006). The particular case of type 1 reveals the pattern of the demographic transition temporized by demographic conservatism, similar to developing countries, requiring a special approach. Beyond these specific trends, however, there is a constant convergence of birth rates at the national level; in the coming decades, we may expect that the national disparities will get levelled, as shown by the evolution of the standard values (Table 1).

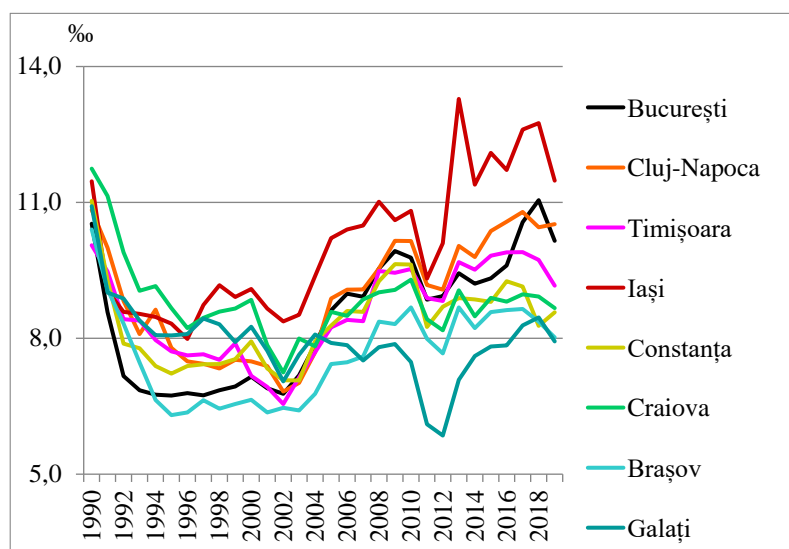


Figure 6. Birth rate dynamics in major Romanian cities (1990–2019).

Data source: INS.

The demographic variables (general fertility of the female population, migration balance and share of the elderly population), as expected, are strongly correlated. In the case of FG we can speak of an implicit character of the correlation, but there is also an interesting increase of the values towards the end, which can indicate a certain homogenization of the reproductive behaviour at national level. The importance of MS is certain and follows a positive dynamics that attests to the role of the population migration to the major urban centres and their metropolitan areas. Emigration, taken into account only for the last two periods, does not seem to have had a significant influence at national level, a situation which is also explained by its predominantly circular, cyclical nature, permanent emigration having a lower share and being offset by immigration, at least according to official estimates. According to INS data, between 2000 and 2019 there were 171,000 permanent emigrants and 514,000 permanent immigrants, most of them from the Republic of Moldova and Ukraine. Many have a “fictitious” domicile in Romania (especially in neighbouring counties such as Iasi, Vaslui, Galati, etc.), being in fact gone to the western states but usually registering their children in Romania. This phenomenon explains the very big difference between the preliminary and the final data on the number of births, in the last years (with a peak in 2013, when preliminarily there were 178,323 births and definitively 214,932, the differences being even bigger in the case of the mentioned counties). The last demographic variable, the share of the elderly population is as strongly correlated, but inversely proportional as is natural. One should note, however, the constant reduction of the correlation index, which can be explained by the tendency of both the elderly population in large cities and of the young population to settle down in metropolitan areas, a combination that reduces, in some contexts, the dependence of birth rate on the degree of ageing.

The analysed socio-cultural variables reveal lower values of the correlation indices, but their evolution is interesting. The share of the agricultural population (AG), dominant in rural areas, has experienced a constantly downward trend. If in the 1990s it still enjoyed certain significance, the rural population being usually more conservative and having a higher birth rate, it later completely reduced its influence, lately having even slightly negative values. Basically, we

can admit that the 1990s were the last years in which the rural population could still represent a reservoir of labour, the relaunch of the rural exodus (including through emigration) after 2000 limiting this role. From this point of view, the demographic recovery of most communes (but also of many small towns) can no longer be conceived without a strong immigration. Of course, we can discuss the extent to which policies meant to stop (especially the external) migration and to stimulate the return migration can be implemented. In the absence of some well-founded local (as sustainable as possible) development programs, favoured by the access to European funds, as shown by some examples of good practice (as for example Ciugud commune, Alba county), it is difficult to anticipate a positive inversion of these regressive trends. The share of the Roma population (RR), mentioned in the descriptive typological analysis as an explanation for the conservative tendencies of type 1, is strongly correlated, proving the importance of the presence of this minority in preserving a higher birth rate. The level of the correlation increases from one period to another, attesting to a delay of these communities in joining the behavioural changes specific to most of the population. The often-cited problem of early births, favoured by a retrograde marital behaviour, seems to be a direct effect. In this way, some of these communities need specific demographic control measures, more similar to the practices adopted by developing countries. The correlation between the share of the Roma population and the dynamics of the birth rate is very strong, as suggested by Figure 7.

The level of education, expressed by the variable ST which shows the share of the population with secondary (high school) and higher education, is inversely correlated with the birth rate. However, the significance of the correlation decreases over time, as a sign of a certain behavioural homogenization, but also of the increase of the share of this category of population (only between the 2002 and 2011 censuses it rose from 31.4 to 38.7% for the population over 10 years old).

The variables which express life quality also show significant correlations (the average income (NP), newly built housing (LN) and urbanistic facilities (DE)). The variable VN follows an evolution similar to that of the level of education, being negatively correlated and experiencing a decreasing influence. The connection between

education and income is a common one in developed societies, explaining this coincidence. However, the smaller incidence does not express an equalization of income, as it might seem, but the role of labour temporary migration for a significant part of the population, especially from rural areas. These movements can also be the vector of some behavioural changes. The construction of new homes was introduced in the analysis based on the presumption of expressing social needs, but the level of correlation is low. However, the values increase from one period to another, as a sign of the concentration of this activity within the attractive areas around large cities. The explosion of constructions in the 1990s and even 2000s seems to be more related to meeting comfort standards or to the inadequacy of the old housing stock to current needs. In the last decade, however, the emphasis has been on providing a housing offer as diverse as possible for the young population attracted by the main development poles. A somewhat similar development has been recorded by DE during the two decades for which there is available information.

The last variables introduced in the analysis, the access to communications infrastructure (CI) and position within the settlement network (PZ) do not show significant correlations with the birth rate. However, their significance lies in the strong (either positive or negative) correlation with the other explanatory variables taken into account, demonstrating their indirect importance in the evolution of the birth rate. Their positive

correlation with the variables that express life quality highlights the role of factors such as isolation and precariousness of infrastructure in providing optimal conditions for maintaining a functional demographic system. It is no coincidence that the types of regressive evolution, marked by a fast decline in the birth rate, are located in isolated areas, far away from major cities and roads. On the other hand, the areas where the decline has been stopped are more frequently located in regions with more developed infrastructure and favourable access to major cities.

The validity of the presented analysis model is illustrated by the high values of the multiple regression coefficient (R²), which have constantly increased. This is also captured by the graphs of the distribution of variables on the factorial plane, which reveal distinct factorial axes (Figure 8). Birth rate appears to be closely correlated with other demographic indicators (FG, SM) but also with some socio-cultural variables (RR), but it is in opposition to the competing process of demographic ageing (VS). The influence of the vectors that express life quality (the level of social modernization and the potential for development) is rather indirect but essential, forming two seemingly competing factorial axes, one expressed (in the model used) only by the socio-professional structure (AG) and a more complex one, with redundant variables, possible to be grouped into a complex indicator.

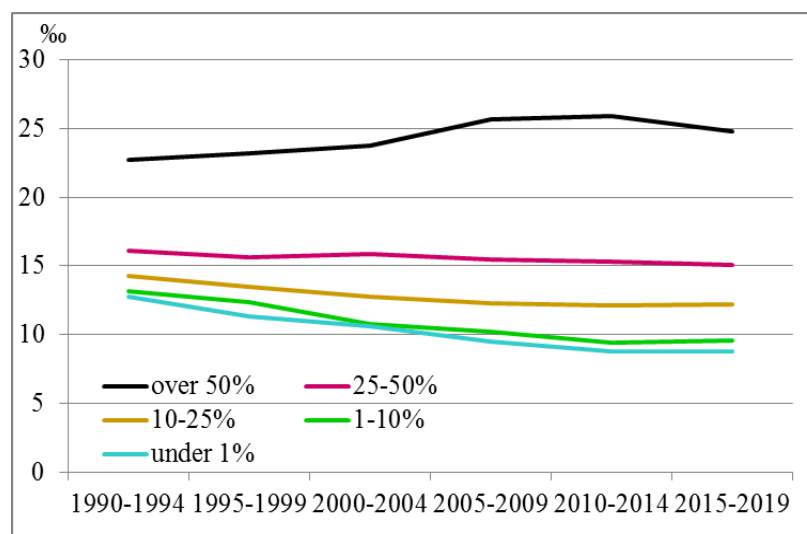


Figure 7. Evolution of birth rate according to the share of the Roma population.
Data source: INS, Tempo Online Database, 1992, 2002, 2011 population censuses.

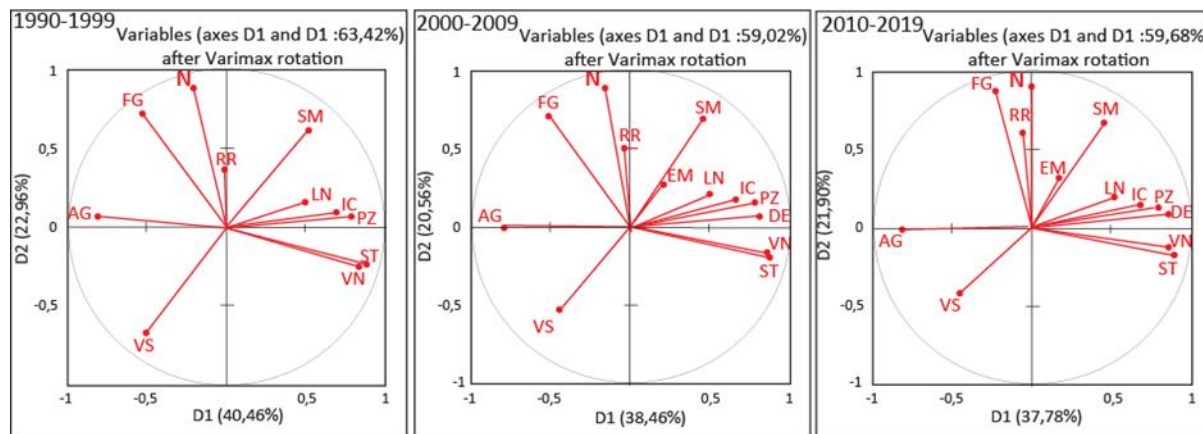


Figure 8. Distribution of variables on the factorial axes.

The results of the factor analysis largely confirm the conclusions of the descriptive analysis, without being able to claim that it covers all the vectors that can change the evolution of the birth rate. Limited by the access to information, the factor analysis presented indicates, however, special causal relationships with certain socio-cultural variables that cannot be eluded when it comes to developing demographic policies. As it emerged from the typological analysis, beyond the general trends of convergence, the diversity of situations requires a local or regional specific approach. At national level only general objectives can be set.

CONCLUSIONS

Demographic issues, integrated through specific evolutions in the context of global challenges, require a complex approach, from all the perspectives offered by contemporary knowledge. A country like Romania, which is facing, among other things, a declining birth rate, cannot remain indifferent to the negative implications of the constant restriction of the social reproduction potential. Stopping or at least delaying this decline becomes an imperative for the future. The political claim of measures that could increase the birth rate is not enough. The increase in the birth rate can be stimulated more successfully in an authoritarian state (an anthological example is that of 1967–1968 Romania under the leadership of Ceaușescu) than in a democratic one, in which freedom of choice motivates behaviours which often diminish the reproductive potential (from the rise in the average age at first marriage to final celibacy, not to mention a woman's right to decide for herself if she wants to keep a pregnancy or not). The

experience of democratic states reveals two major options: *application of family support policies* or *permeability to international migration flows*. In the first case, the success of the policies is ensured by the consistency in applying them at the level of one generation for an as long as possible period of time. It is only in this way that their effects can be traced. Measures which are applied for several years and then withdrawn for more or less objective reasons cannot have long-term effects. The success of any measure also depends on the health of the economy, on its resilience to cyclical crises and on the structural changes inherent to the globalization process, automation of production and circulation of commodities being often felt within the demographic evolution. For example, the last major economic crisis (2007–2008) caused a significant decline in birth rates in most European countries, with lasting effects in the Mediterranean states, which still have not recovered ever since (Hansen, Gordon, 2014). In the second case, the decline in the birth rate can be solved out in the short term, as immigrants are generally young and, when they come from less advanced countries, they prefer larger families. The case of Germany is illustrative in this respect, from an average of 682,000 births in 2010–2014 rising to 776,000 in 2015–2019, as an effect of accepting the huge wave generated by the recent migration crisis. Similar, less spectacular situations have also been recorded in other migrant recipient countries (Sweden, Austria, etc.). In the long run, however, such an approach is not necessarily beneficial because immigrants also grow old, joining the existing generations. The excessive swelling of the middle part of the age pyramid, specific to attractive states, can lead to a strong ageing process over time, as second-generation immigrants adapt to the local demographic pattern.

This can only be a solution if they officially accept their transformation into a state of immigration, according to the pattern of the New World states. It is, in fact, what multicultural and globalist ideology preaches.

In the case of our country, betting on increasing its attractiveness, thus counteracting its own emigration, is relatively illusory, as long as it preserves a significant development gap in comparison to Western states. Thus, the only medium-term option remains to focus on shaping a favourable framework for meeting the generation replacement rate. The decline in the birth rate should not necessarily be linked to the reduction of the population number, which cannot be avoided as long as there is a strong inter-generational imbalance in favour of the elderly population. It is illusory to believe that the recovery of the fertility indicators could bring an end to the natural deficit, since the active component of social reproduction, women of fertile age, will continue to be fewer and fewer, as pointed out from the beginning. In order to be successful, demographic policies must be integrated into the broader framework of development policies, from the local to the national level, starting from the premises of the existing potential, identified on the basis of a comprehensive territorial diagnosis. Finally, the declining birth rate in Romania is also due to the insufficient exploitation of the resources, mainly the agricultural ones, which are essential for a predominantly rural country from a spatial perspective. This deficit brings about other types of deficit, which practically condemns the demographic system to a continuous contraction. The necessary recovery and resilience suggested by the European fora, rather seen from an economic perspective, also requires a social approach and, last but not least, a territorial one. The manifestation of certain territorial gaps, disparities, cleavages and dysfunctions can jeopardize any recovery effort. For these reasons, we reiterate the idea presented above, that of adapting the policies aimed at increasing the birth rate to the local context.

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