POPULATION DYNAMICS IN CRIŞANA AND BANAT DURING THE PERIOD 1990 – 2010

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Abstract
The study analyses the population dynamics in Crişana and Banat territories, respectively from Bihor, Arad, Timiş and Caraş Severin counties. For this purpose, certain factors involved in this process were analyzed, respectively birth rate, mortality, the rate of natural population growth and the spatial migratory. As far as birth rate and mortality are concerned, these aspects had an oscillatory development, but adopting different directions of evolution, respectively a descending trend in the case of birth rate and an increase in the case of mortality. Due to this manner of manifestation result a negative rate of natural population growth in all the counties representing the main factor that caused the decline in population numbers in the territories mentioned. The analysis of the net migratory movement shows that migration growth has been positive on the whole interval where Bihor, Arad and Timis, alleviating to some extent the reduction in the population and negative values in a high proportion in Caras-Severin.
Key words: population dynamics, birth rate, mortality, the rate of natural population growth.
JEL Classification: J11; J10

Introduction
The necessity of scientific approach of the population dynamics emerges as a pressing requirement in the context of any future development of any economy. Evolution of the population, from it dynamic to its structural relationships require the decision makers to develop clear strategies to ensure the suitable conditions necessary for human reproduction and concrete measures to protect existing human potential.

The county level analysis of population dynamics highlights the specific trends of the population in that territory, specific imprinted of the concrete conditions of social and economic, providing the basis to develop demographic forecasts and planning of economic and social activities.

Given those mentioned on this paper we aim to highlight and analyze population dynamics in Banat and Crişana territories, respectively from Bihor, Arad, Timiş and Caraş Severin counties. These counties add up a surface of 32.515 km² and contain a population of 1.759.435 individuals, which means 8,2 % of the population of the country.

Literature review

On the one hand, it is now wildly recognized that population issue must be addressed when designing resource allocation process. Descriptive aspects of the population play an important role because expectation about evolution of the size and the composition of the population are important when choosing public policies. Furthermore, because size and composition of the population are best treated as important endogenous in modern models of resource allocation, normative issues regarding the desirability of demographic development should be included in any public policy agenda.

In this regard, the work of Jacob S. Siegel (2002) analyzes and discusses the main issues and activities which are used by demographers working for government agencies, private nonprofit organizations, and businesses deal. It emphasizes the demography aspects and activity in a variety of related disciplines, including public policy, law, sociology, public administration.

Other study analyzes the role of factor markets of fundamental pension reforms (Ludwig, 2005). As well, Herrera-Restrepo O.A. and Medina-Borja A. (2012) suggest that it is a significant effects of factors such as: network configuration and socio-demographic characteristics over social service such as services provided, donations, number of active chapters and volunteers. In the same time, some other researches highlight the impact of population dynamics on environmental policy or environmental economics (Elbers & Withagen, 2004; Quaas, & Lange, 2007; Hoel, & Shapiro, 2003).

On the other hand, in an increasingly globalized world, demographic trends are important in economic activity and social life, because of the theoretical relationship and influences of population dynamics on economic growth (Annicchiarico & Piergallini, 2006; Crenshaw et al., 1997; Jesús Fernández-Villaverde, 2001; Bloom, & Williamson, 1998).

The correlation between populations' dynamics on economic growth may have two meanings. The first meaning is that population dynamics influences the development of the economy and, on the other hand, economic growth has a certain impact on demographic evolution (Boroacă & Anttila, 2014). There are different points of view on the matter of correlations that may exist between the dynamics of the population and the growth of economic activity. Some experts bind the increase or decrease of economy on demographic factors or linked to population dynamics.

In this regard, some recently studies highlight that there is a connection between the economic aspects and the population age-structure: influence on financial asset returns or social security expenditures (Brunetti & Torricelli 2010; Jimeno et. al, 2008; Poterba, 2001); predictability of the stock market and financial markets (Geanakoplos et al., 2004; Gonand, 2005).

In the same time, other studies regarding the population dynamic highlight the impact of fertility on economic aspects. In this respect, Quamrul H. Ashrafy, David N. Weilz and Joshua Wildex (2012) reveal the effect of fertility reduction on economic growth. Other important studies reveal, as well, the impact of fertility as

population dynamics factor on economic grow (Hazan & Berdugo, 2002; Davis, & Lopez-Carr, 2010; Biljan-August & Štambuk, 2005) Recently, the consensus perspective has shifted from a fertility declines having strong effects, to it less importance upon economic growth (Sindig 2009; Das Gupta, et al., 2011).

Regarding Romania, some research work highlights that during the years 1990-1999 the population dynamics had a significant influence on GDP growth. In that sense, some specialists in economy (Băbăiță et al, 2003) suggests that the decline of the population is reflected in an increase of GDP. At the same time, the researchers Boroacă L.R. and Anttila C. (2014) draw the same conclusions in their work. Thus the results of their research highlights that, during 1990-1999 and 2000-2013, the population and GDP had opposite trends in Romania: the population size decreased meanwhile the GDP increased.

Methodology and data

Population dynamics research was conducted in a comparative perspective, following to highlight, in a comparative manner, the demographic processes and phenomena of the 4 counties (Bihor, Arad, Timis and Caras Severin), on a time interval ranges between 1990 to 2010. The basis of the research was not only the analysis and synthesis of scientific data but also the data representation analysis. On the other hand, from the methodological point of view, it must be stressed that the analysis of population dynamics was conducted using socio-demographic data from the Romanian National Institute of Statistics (INS) - Statistical Yearbook of Romania (the years 1990-2001), taking into consideration following indicators: numerical evolution of the population, birth rate, death rate and migration.

Also, based on data related to birth and mortality rate the authors calculated a new indicator called the rate of natural population growth (the difference between the birth rate and mortality rate). As a method of analysis used by the authors, we mention that the data provided by the National Institute of Statistics (INS) was processed and interpreted using graphics analysis. In this way, the graphical representation and analysis of the data facilitates the understanding of the whole evolution of indicators, respectively it highlight more clearly the general trend - increases and decreases on each indicator.

Within the analysis of the population dynamics, it was taken into consideration, the fact that the population of each county represents an open demographic system, where the entries are represented by birth rate and immigration, and the exits by mortality and emigration. The movements taking place within the system are reflected through the numerical size of the population, respectively in the increase or decrease from one period to another, outlining a certain evolution, adopting a specific particularity according to the characteristics of the analyzed territory. In order to emphasize this evolution of the overall population in the mentioned counties, the statistical records from a period of 21 years were analyzed, respectively during the period 1990-2010, regarding population size, birth rate, mortality, the rate of natural population growth and the migration of the population.

Results / Findings

By observing the numerical evolution of the population from Bihor County, it was determined that this county entered a descending direction, materialized in a decrease of 67555 individuals during the year of 2010, compared to the year of 1990, which represents a decrease of the population size with 10,3 %.

During the analyzed period, two particular years are emphasized, showing significant decrease, respectively the year of 1992, when a decrease of the population size is recorded, meaning 21.571 individuals (3,27 %) compared to the preceding year, and the year of 2002, when a decrease of 16386 individuals (2,6 %) takes place, compared to the year of 2001 (Figure 1).

Figure 1 The numerical evolution of the population from Bihor County
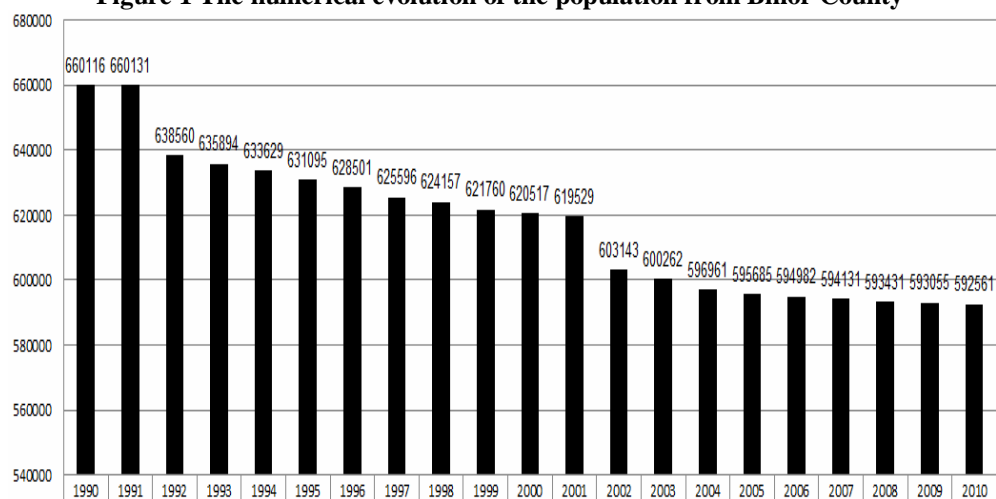
Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

The regressive direction of the numerical evolution of the population was determined, on one way, by the variation, from one year to another, of the birth rate and of mortality, materialized through the rate of natural population growth, and on the other side, by the process of migration.

Therefore, the birth rate decreases from 13,2 ‰ in 1990 to 10,7 ‰ in 2010, with slight variations during the process, between 10,1 ‰ (2002) and 11,8 ‰ (1992) (Figure 2). As far as the rate of mortality is concerned, this had an increasing evolution, increasing from 12,7 ‰ (1990) to 14,8 ‰ (1996), after which it crosses over to a decreasing evolution, reaching, in 2010 to 12,5 ‰ (Figure 2).

As a result of the above mentioned evolution, the rate of natural population growth was reduced from 0,5 ‰ (1990) to - 4,1 ‰ (1997), so that later to present an inconstant decrease, reaching to - 1,8 ‰ in 2010 (Figure 2).

The analysis of the territorial movements, respectively of the departures and entries of population, emphasizes the fact that from the county a number of 135.432

individuals have emigrated and a number of 161.007 individuals have immigrated, resulting from this, on average, a plus of population, of 5.575 individuals.

Figure 2 The evolution of the birth rate, of the mortality rate and of the rate of natural population growth in Bihor County
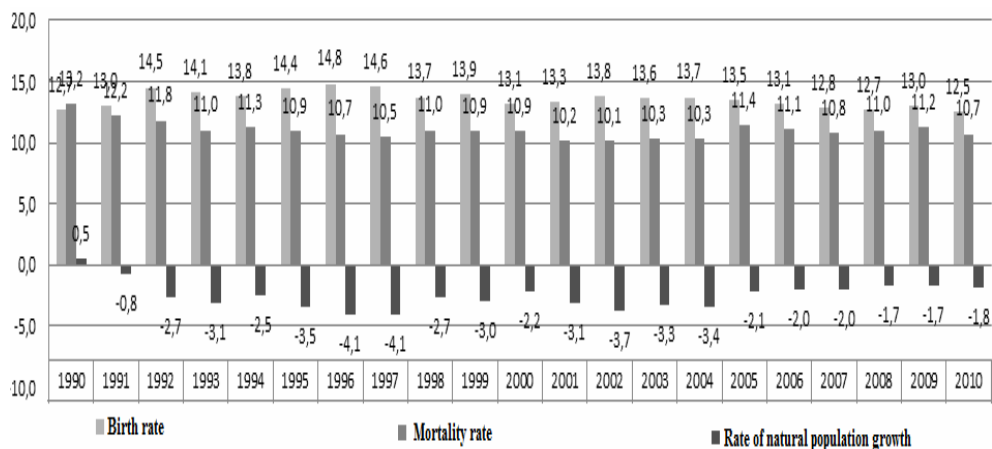
Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

There were, however, two specific years when the net migration index had negative values, respectively in 1990, when the recorded value is of – 2.086 individuals and the year of 2001, when a number of - 396 individuals is recorded (Table 1).

Table 1 Migration in Bihor County during 1990-2010

| Year	Departures (D)	Entries (E)	E – D	Year	Departures (D)	Entries (E)	E – D
1990	11305	9219	- 2086	2002	7583	7965	382
1991	6481	7159	678	2003	7920	8032	112
1992	6076	6418	5148	2004	9017	9358	341
1993	4981	5148	167	2005	6448	6677	229
1994	5514	5973	459	2006	7928	8656	722
1995	6447	6722	275	2007	9545	10472	927
1996	6456	6670	214	2008	9756	10348	592
1997	6830	7241	411	2009	7697	8174	477
1998	6360	6851	491	2010	11260	12071	811
1999	6434	6716	282	**Total departures:**		155432	
2000	5457	5602	145	**Total entries:**		161007	
2001	5937	5541	- 396	**Net migration:**		5575	

Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

As a result of the decrease of the population size, the general density on county level decreased from 85,1 (1990) to 76,4 inhabitant/km².

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The population dynamics of Arad County recorded, during the entire studied period, a descending evolution. The population size decreased with 53.350, from 508.302 (1990) to 454.952 (2010), which represents a loss of 10,5 %.

During this period there are three years to be marked out due to the decrease of the population size with 4.539 inhabitants, compared to the previous year, 1992, when the population size decreases with 16.933 inhabitants compared to the years of 1991 and 2002, when a decrease of 12.912 inhabitants is recorded (Figure 3).

Figure 3 The numerical evolution of the population in Arad County
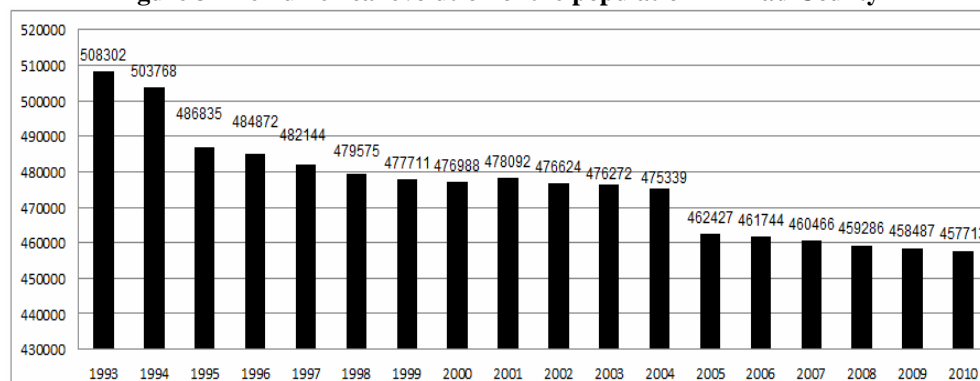
Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

The presented situation was determined primarily by birth rate and mortality. The birth rate recorded a regressive evolution, decreasing from 11,4 ‰ (1990) to 9,3 ‰ (2010). During this period the values indicated by the birth rate oscillated in 80,4 % of the cases, between 9,0 ‰ and 9,5 ‰

As far as mortality is concerned, this had an ascending evolution until the year of 1996, increasing from 14,5 ‰ (1990) to 15,9 ‰ (1996), after which it enters a slightly descending pace, reaching 13,5 ‰ (2010).

The decreasing of birth rate and the increase of mortality during the entire period generated a negative rate of natural population growth, which maintained itself during the entire period.

The rate of natural population growth reaches the lowest value of - 6,6 ‰ in 1996, after which it slightly increases, reaching - 4,2 ‰ in 2010. The most frequent values are recorded between - 4,5 and - 5,5 ‰, in 61,9 % of the cases.

Due to this reason, the rate of natural population growth has contributed, to the utmost extent, to the diminishing of the population size within the county (Figure 4).

The analysis of the phenomenon of population migration shows that from the surrounding area of the county have emigrated, during this period, a number of 124.131 individuals and have immigrated 177.859 individuals, from where it results an index of positive net migration. The positive values of net migration improve the negative effect of the rate of natural population growth upon the numerical growth of the population with 53.728 individuals (Table 2).

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Figure 4 The evolution of the birth rate, of the mortality rate, and of the rate of natural population growth in Arad County
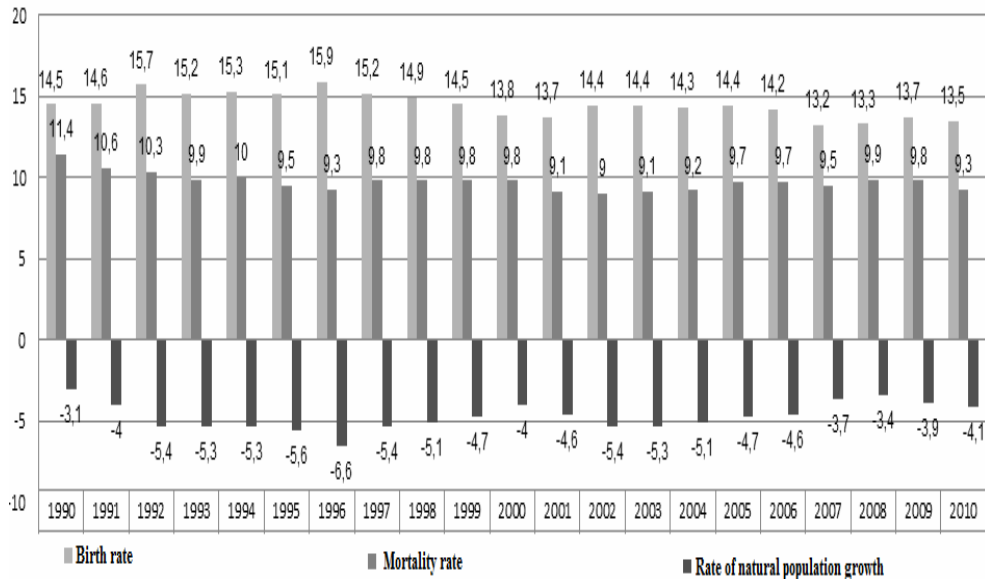
Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

**Table 2 Migration in Arad County during 1990-2010**

Year	Departures (D)	Entries (E)	I – D	Year	Departures (D)	Entries (E)	I – D
1990	15310	28587	13277	**2002**	5482	7030	1548
1991	4482	8604	4122	**2003**	6082	8063	1981
1992	4733	7977	3244	**2004**	6373	8042	1669
1993	3718	6154	2436	**2005**	4643	5540	897
1994	4441	6271	1830	**2006**	5971	7616	1645
1995	5349	7601	2252	**2007**	6911	8576	1665
1996	5255	7303	2048	**2008**	6972	8489	1517
1997	5221	7857	2636	**2009**	5884	6545	661
1998	4948	7728	2780	**2010**	7997	9321	1324
1999	4515	6703	2188	**Total departures:**		124131	
2000	4860	7187	2327	**Total entries:**		177859	
2001	4984	6665	1681	**Net migration:**		53728	

Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

The analysis of the numerical evolution of the population in Timiş County emphasizes a succession of periods of increase and decrease. The first years when decreases of the population size were recorded were, the year of 1991, when a reduction of 9.862 individuals takes place, and the year of 1992, when the population size decreases with 21.479 individuals. Since 1992 until 1997, decreases and increases appear from one year to the other, but insignificant as far as the population size is concerned. The year

of 1998 is again recorded as a year with a more significant loss of population (10.461 individuals), after which an increase of population size follows, until the year of 2001 with 5.762 individuals. During the year of 2002 takes place the most important numerical decrease of population, respectively of 25.581 individuals, in comparison to the previous year. Since 2002, the population size in maintained approximately to the same level until the year of 2006, when we witness a significant increase until the year of 2010, respectively of 18.729 individuals (Figure 5).

**Figure 5 The numerical evolution of the population in Timiş County**
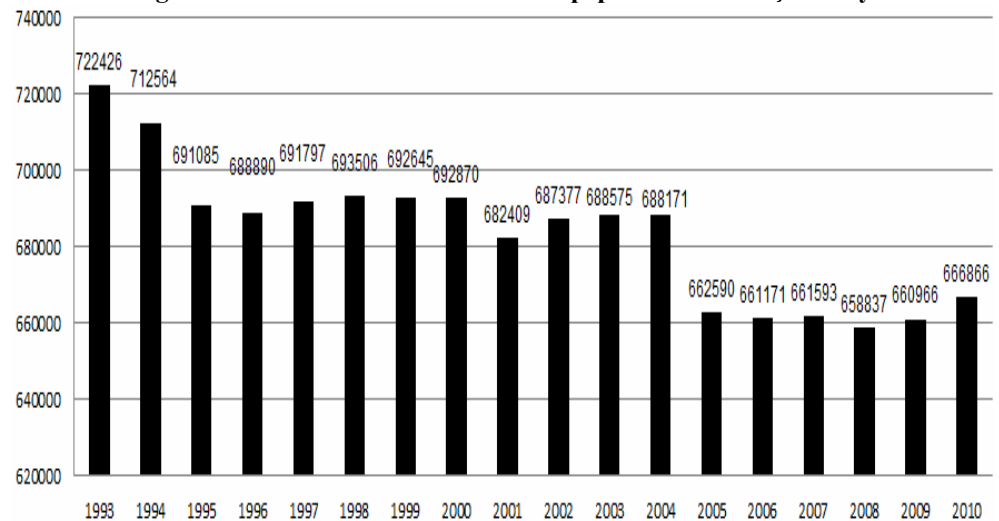
Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

The factors that have generated the numerical evolution of the population, previously presented, were mainly birth rate and mortality. Therefore, the birth rate had a descending evolution, decreasing from 12,0 ‰ (1990) to 8,6 ‰ in 2001, after which a slight increase follows, reaching in 2010 an index of 10,2 ‰. The highest frequency, respectively the one occurring in 47,6 % of the cases, is held by the index of birth rate enclosed between 9,1 ‰ and 9,9 ‰.

As far as mortality is regarded, this was recorded with an ascending progress, increasing from 11,7 ‰ (1990), to 13,0 ‰ in 1996, after which it slightly decreases, oscillating until the end of the period between 11,3 ‰ and 12,2 ‰. The highest frequency, of 52,4 %, is held by the rate of mortality included between 12,00 ‰ and 12,7 ‰.

From the manner of manifestation of these two above mentioned indexes, resulted a negative rate of natural population growth. This decreases from 0,3 ‰ (1990), to - 3,8 ‰ in 1996, after which it records an oscillating progress, with values between - 2,0 ‰ and - 3,1 ‰ until the year of 2005. Since 2005 a slight increase takes place, reaching, at the end of the period, a value of - 1,5 ‰. The highest frequency belongs to the rate of natural population growth recorded between - 2,0 ‰ and - 2.9 ‰.

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Figure 6 The evolution of the birth rate, of the mortality rate, and of the rate of natural population growth in Timiş County
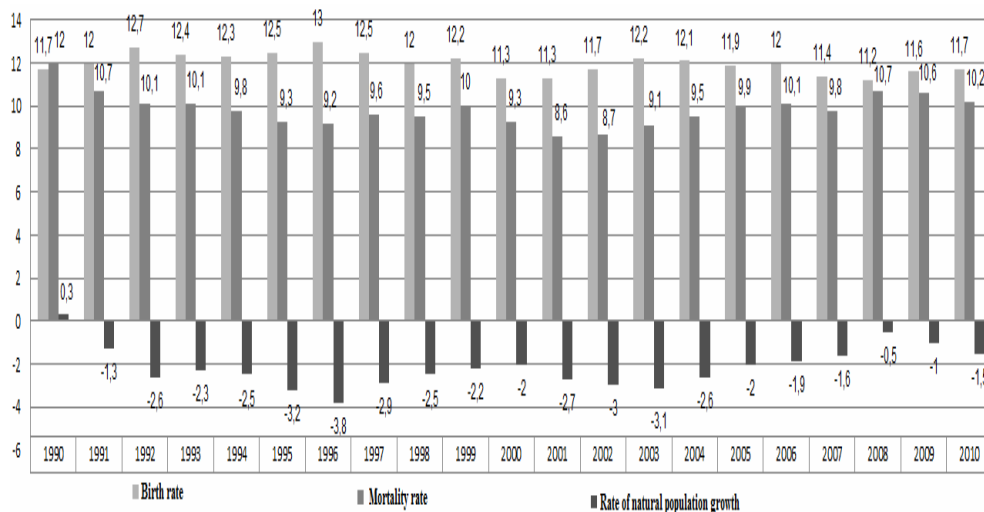
Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

The analysis of the phenomenon of migration emphasizes the fact that from the surrounding area of the county has left a number of 194097 individuals and 309.214 individuals has entered the territory, resulting a plus of population of 115.117 individuals, a number with which the negative effect of the rate of natural population growth was attenuated. The highest number of individuals entering the area of the county was recorded during the period of 1990-1992, respectively 63.756 people, and during the period of 2006-2010, when the number increases to 82.480 people. As far as the departures from the perimeter of the county are regarded, the highest number was recorded in 1990, respectively 15.310 individuals and during the period of 2007-2010, when the number increases to 27.764 individuals (Table 3).

Table 3 Migration in Timiş County during 1990-2010

Year	Departures (D)	Entries (E)	E – D	Year	Departures (D)	Entries (E)	E – D
1990	25830	66445	40615	2002	7270	9230	1960
1991	6629	16253	9624	2003	7964	10144	2180
1992	7676	16520	8844	2004	9801	12474	2673
1993	5577	10250	4673	2005	8308	10444	2136
1994	6418	10207	3789	2006	9716	14446	4730
1995	6807	10313	3506	2007	11517	16482	4965
1996	6984	10017	3033	2008	12671	16536	3865
1997	6445	9439	2994	2009	11076	14558	3482
1998	6972	8771	1799	2010	15537	20458	4901
1999	7213	8354	1137	**Total departures:**		194097	
2000	6676	8340	1664	**Total entries:**		309214	
2001	6986	9533	2547	**Net migration:**		155117	

Source: self-processing of Statistical Yearbook of Romania–the years of 1990-2011 data

The analysis of the population dynamics in Caraş Severin County presents the same descending evolution, as well as in the previously mentioned counties, but it evolved without important events. It can, however, be observed a certain significant decrease of the population size during the year of 1992, when this is reduced with 24.228 individuals and during the year of 2002, when the population size decreases with 14.408 individuals. During the remaining period, the evolution of the population dynamics has an almost linear development (Figure 7).

Figure 7 The numerical evolution of the population in Caraş Severin County
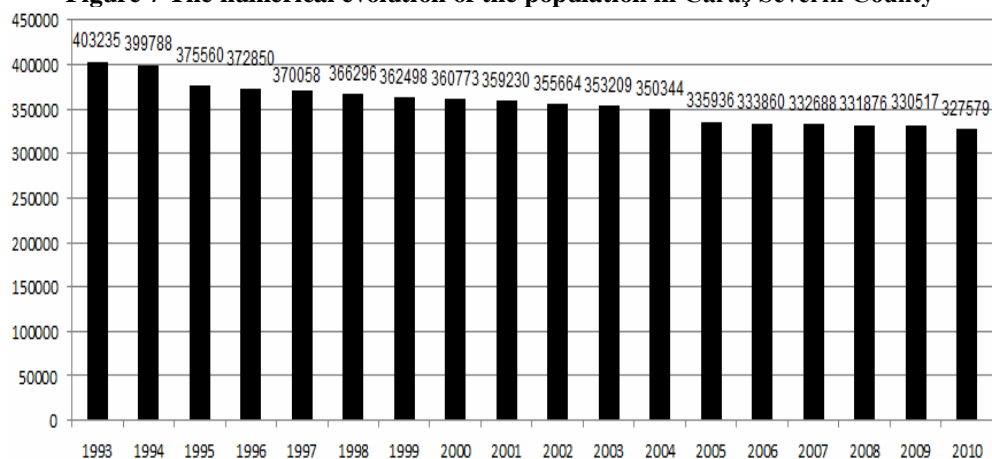
Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

The fact that the population size was reduced, from one year to the other, during this entire period, took place because of the manner of manifestation of birth rate and of mortality, in conjunction with the territorial movement. Therefore, the birth rate suffered a decrease from the rate of 12,2 ‰ (1990) to 8,4 ‰ (2010). As far as mortality is concerned, this increased from 12,5 ‰ (1990) to 14,0 ‰ (2005), after which it slightly decreases reaching to 13,3% in 2010.
The decreasing of birth rate and the increase of mortality have generated a negative rate of natural population growth during the entire period, the rate of natural population growth decreasing from - 0,3 ‰ (1990) to - 4,9 ‰ in 2010. The negative values of the rate of natural population growth had a powerful impact upon the population dynamics, contributing in proportion of 94,6 % to its numerical decrease. From among the 82.395 individuals, representing the value with which the population size was reduced in 2010, as opposed to the year of 1990, the lack of 77.969 individuals is owed to the rate of natural population growth (Figure 8).
The analysis of the territorial movement indicates the fact that from the surrounding area of the county, during this period of 21 years, a number of 111.640 individuals have departed, and a number of 107.214 individuals have been established in the county, which, as a conclusion, means a decrease of the population size with 4.426 individuals. During the entire period, the index of net

migration embraced negative values in 76,2 % of the cases, positive values being recorded only during the years of 2001-2005.

Figure 8 The evolution of the birth rate, of the mortality rate, and of the rate of natural population growth in Caraş Severin County
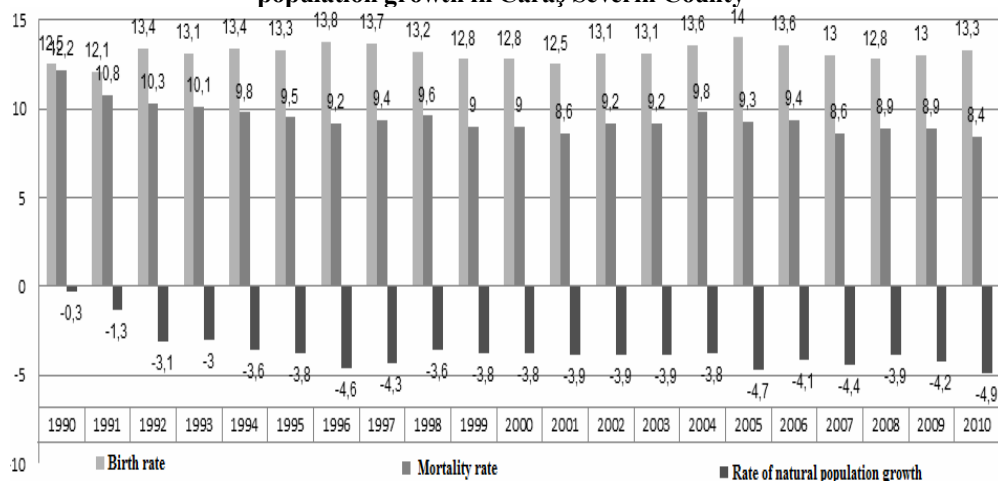
Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

As far as the negative values are regarded, these are materialized in a reduced number of individuals, varying from one year to the other, between 20 and 600 individuals.

This situation caused the negative influence of net migration upon the numerical growth of the population to be a modest one, the population losses in 2010, as opposed to the year of 1990, to be of only 5,4 % of the total (Table 4).

Table 4 Migration in Caraş Severin County during 1990-2010

Year	Departures (D)	Entries (E)	E – D	Year	Departures (D)	Entries (E)	E – D
1990	11156	9401	- 1755	**2002**	5553	6215	622
1991	5121	5368	247	**2003**	5902	6560	658
1992	5176	5155	- 21	**2004**	6561	6996	432
1993	4065	3871	- 194	**2005**	4310	4558	248
1994	4248	4067	- 181	**2006**	5734	5484	- 250
1995	4131	3613	- 518	**2007**	6723	6188	- 535
1996	4100	3950	- 150	**2008**	6898	6473	- 425
1997	4160	3728	- 432	**2009**	4717	4130	- 587
1998	3631	3315	- 316	**2010**	7163	6219	- 944
1999	3448	2884	- 564	**Total departures:**			111640
2000	3929	3723	- 206	**Total entries:**			107214
2001	4874	5316	442	**Net migration:**			- 4426

Source: self-processing of Statistical Yearbook of Romania – the years of 1990-2011 data

Discussion and Conclusions

Out of the analysis of the population dynamics from the four counties, several important conclusions are to be pointed out. Therefore, the birth rate decreased compared to the year of 1990, in all the counties and during the entire analyzed period. The highest birth rate was recorded in Bihor County, presenting values oscillating between 13,2 ‰ (1990) and 10,7 ‰ in 2010, and the lowest in Caraş Severin County, with values between 12,2 ‰ (1990) and 8,4 ‰ (2010). As far as mortality is regarded, it had, with small exceptions, an ascending trend. With the highest rate of mortality is Arad County, where the mortality index oscillates between 14,5 ‰ (1990) and 15,9 ‰ in 1996, after which it begins to decrease until 13,5 ‰ in 2010. The lowest mortality rate was recorded in Timiş County, this oscillating between 11,7 ‰ and 12,7 ‰.

As a result of the way of manifestation of the birth rate and of mortality, the rate of natural population growth recorded negative values in all the counties and during the entire analyzed period. The lowest values are held by Arad County, where in 47,6 % of the analyzed years, there are values recorded between - 5,1 ‰ and - 6,6 ‰. In this county, the rate of natural population growth had the greatest negative effect upon the numerical growth of the population. The rate of natural population growth, with less lower values, although negative, was recorded in Timiş County, where the index of the rate of natural population growth rarely exceeds - 3,0 ‰.

As for the territorial movement of the population, the county with the most departures, respectively 194097 individuals, is represented by Timiş and this is also where the highest population size entries, within the area of the county, is recorded, respectively of 309214 individuals.

As a consequence of this situation, net migration has contributed, during the analyzed period, to the numerical growth of the population, with 115.117 people. In Bihor and Arad counties as well, the index of net migration has registered positive values, contributing to the numerical growth of the population, respectively in Bihor with 5.575 and in Arad with 53.728 individuals. Negative values, in 71,4 % of the analyzed years, were recorded, by the net migration index, in Caraş Severin County. As an effect of net migration, the population size of the county has decreased, as an overall, with 4.426 individuals.

Finally, as an effect of the above presented, the numerical evolution of the population was registered in a regressive trend, therefore, in 2010, in each county, a population deficiency was recorded. The greatest decrease occured in Caraş Severin County, respectively of 20,4 %, followed by Arad with 10,5 %, Bihor with 10,2 %, and the lowest in Timiş County, with 5,9 %.

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