Analysis of Natural Movement of Romanian Population During 2007-2014 - I

Cătălin Angelo Ioan[1]

Abstract: Article shall carry out the analysis of natural movement of Romanian population During 2007-2014. They are thus treated indicators: Live births, Deceased, Natural increase, Marriages, Divorces and Deaths under 1 year. In addition to the regression analysis, are determined the median, quartiles, the arithmetic mean and standard deviation for each indicator. Also the analysis examines dependence aforementioned indicators of regional GDP variation.

Keywords: live births; deceased; natural increase; marriages; divorces

JEL Classification: Q56

1. Introduction

In what follows we shall carry out the analysis of natural movement of Romanian population During 2007-2014. They are thus treated indicators: Live births, Deceased, Natural increase, Marriages, Divorces and Deaths under 1 year. In addition to the regression analysis, are determined the median, quartiles, the arithmetic mean and standard deviation for each indicator. Also the analysis examines dependence aforementioned indicators of regional GDP variation.

In the first part, we shall analize the following counties: Alba, Arad, Arges, Bacau, Bihor, Bistrita-Nasaud, Botosani, Braila, Brasov, Bucharest and Buzau.

2. Analysis of Natural Movement of Romanian Population During 2007-2014

2.1. Analysis of natural movement of Alba County population

Statistics of natural movement corresponding to Alba County are the following:

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Table 1. The natural movement of Alba County population during 2007-2008

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,07	278	412	-134	199	48	5	ian,08	337	432	-95	84	26	2
feb,07	268	373	-105	334	53	2	feb,08	301	374	-73	110	67	4
mar,07	287	367	-80	158	66	4	mar,08	269	377	-108	93	67	2
apr,07	269	412	-143	207	47	5	apr,08	264	360	-96	47	35	1
mai,07	298	346	-48	280	45	2	mai,08	290	422	-132	270	48	3
iun,07	295	301	-6	252	43	2	iun,08	295	367	-72	219	75	5
iul,07	314	381	-67	376	25	2	iul,08	340	344	-4	331	30	5
aug,07	292	302	-10	450	51	4	aug,08	286	304	-18	518	50	4
sept,07	281	351	-70	427	36	4	sept,08	305	329	-24	315	56	3
oct,07	286	382	-96	286	29	6	oct,08	302	377	-75	228	27	5
nov,07	311	371	-60	144	40	4	nov,08	268	371	-103	134	65	3
dec,07	283	351	-68	54	47	0	dec,08	263	389	-126	38	60	7

Source: INSSE

Table 2. The natural movement of Alba County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	273	471	-198	84	28	3	ian,10	278	397	-119	76	36	1
feb,09	260	372	-112	116	77	3	feb,10	253	375	-122	70	48	0
mar,09	292	437	-145	52	40	0	mar,10	276	393	-117	53	81	4
apr,09	327	393	-66	64	57	2	apr,10	237	407	-170	125	65	4
mai,09	266	340	-74	298	61	1	mai,10	265	406	-141	258	60	2
iun,09	334	365	-31	143	56	3	iun,10	290	317	-27	67	57	3
iul,09	349	340	9	373	40	3	iul,10	313	366	-53	385	58	1
aug,09	331	383	-52	410	59	4	aug,10	316	355	-39	341	52	5
sept,09	339	379	-40	373	37	1	sept,10	289	325	-36	326	28	1
oct,09	309	398	-89	296	27	2	oct,10	262	378	-116	191	29	4
nov,09	268	396	-128	114	42	2	nov,10	279	402	-123	73	50	6
dec,09	265	411	-146	47	34	3	dec,10	255	397	-142	36	99	0

Source: INSSE

Table 3. The natural movement of Alba County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	236	359	-123	59	45	2	ian,12	220	423	-203	49	15	0
feb,11	246	367	-121	80	60	4	feb,12	243	380	-137	74	43	0
mar,11	254	396	-142	35	12	6	mar,12	218	443	-225	28	46	1
apr,11	238	437	-199	45	122	4	apr,12	207	380	-173	64	53	2
mai,11	254	433	-179	212	58	6	mai,12	303	357	-54	224	74	2

iun,11	290	325	-35	166	25	2	iun,12	266	358	-92	176	61	2
iul,11	315	344	-29	323	66	1	iul,12	348	393	-45	306	36	2
aug,11	333	344	-11	316	54	1	aug,12	318	304	14	320	48	1
sept,11	310	305	5	281	45	2	sept,12	301	321	-20	312	27	1
oct,11	272	344	-72	196	48	2	oct,12	294	331	-37	194	51	2
nov,11	266	372	-106	77	48	4	nov,12	255	340	-85	72	61	2
dec,11	225	376	-151	46	65	4	dec,12	245	393	-148	52	57	0

Source: INSSE

Table 4. The natural movement of Alba County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	271	368	-97	48	28	2	ian,14	241	341	-100	47	17	2
feb,13	213	326	-113	53	47	0	feb,14	250	357	-107	74	38	1
mar,13	218	396	-178	89	68	2	mar,14	265	386	-121	55	37	0
apr,13	254	370	-116	23	55	2	apr,14	251	359	-108	59	35	1
mai,13	268	367	-99	155	47	2	mai,14	248	368	-120	216	71	2
iun,13	237	371	-134	244	27	2	iun,14	259	336	-77	144	29	3
iul,13	299	363	-64	286	52	2	iul,14	300	325	-25	276	30	1
aug,13	306	306	0	357	34	1	aug,14	278	278	0	365	40	2
sept,13	322	329	-7	274	26	0	sept,14	309	327	-18	244	46	6
oct,13	271	390	-119	192	38	4	oct,14	266	355	-89	200	41	4
nov,13	239	307	-68	104	33	1	nov,14	227	352	-125	86	49	1
dec,13	226	427	-201	61	43	3	dec,14	237	498	-261	114	58	2

Source: INSSE

Table 5. The population trends of Alba County during 2007-2014

Source: INSSE

Year	Population	Year	Population
2007	394641	2011	388869
2008	393390	2012	387394
2009	391990	2013	385716
2010	390612	2014	384135

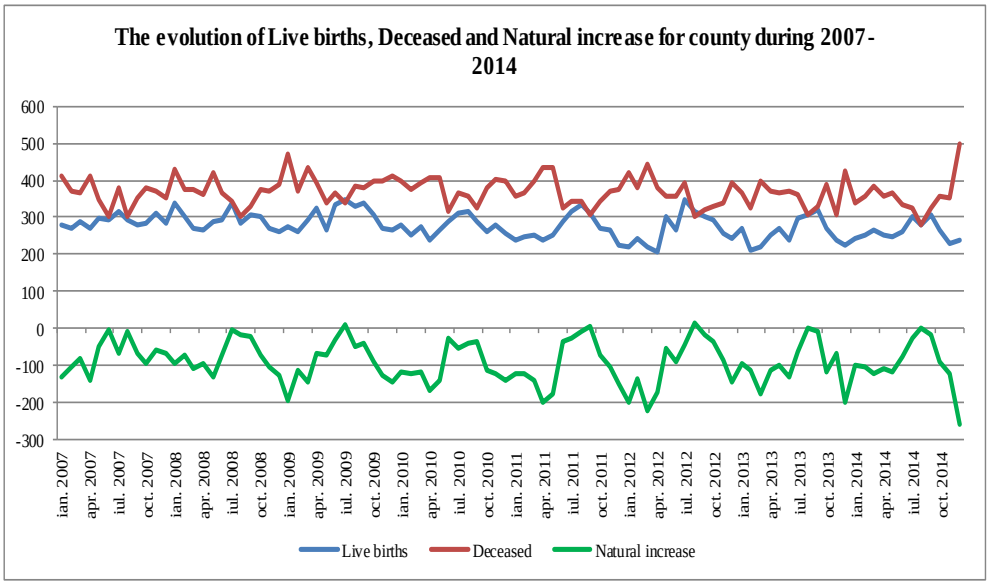


Figure 1

From figure 1 we can see a sinusoidal evolution of the indicator. Except months iul 2009, sept 2011, aug 2012, aug 2013, aug 2014 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-0.427319588x+298.0166667 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=-0.196100109x+378.5212719 where x is the number of month (Jan, 2007=1), therefore a downward trend.

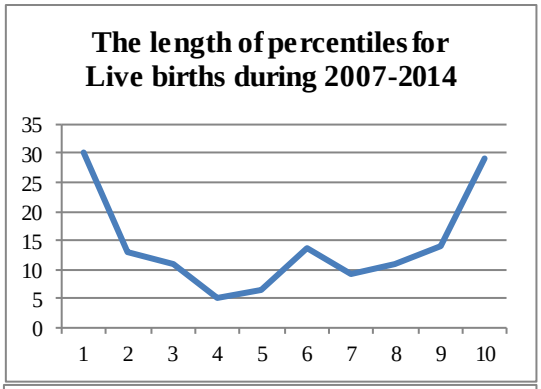
Regression analysis relative to indicator "Natural increase" gives us an equation: y=-0.231219479x+-80.50460526 where x is the number of month (Jan, 2007=1), therefore a downward trend.

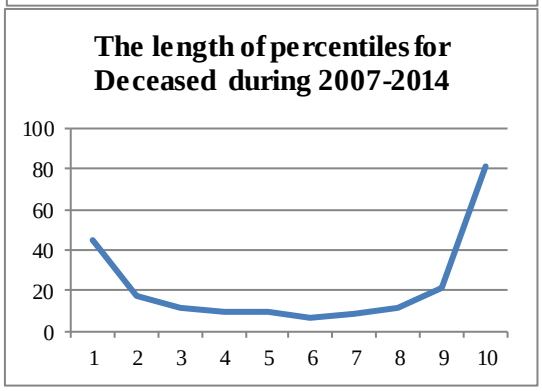
For the set of values above, the median indicator for "Live births" is 273, for "Deceased" is 369 and for "Natural increase": -96. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (207,254,272.5,301,349), for "Deceased": (278,344,369,393,498) and for "Natural increase": (-261,-125.25,-96,-47.25,14).

The arithmetic mean and the standard deviation for "Live births" are: (277, 32.9), for "Deceased": (369,38.71) and for "Natural increase": (-92,57.35). This means that with a probability greather than 0.68 "Live births" are in the range [244,310], for "Deceased" in [330,408] and for "Natural increase" in [-149,-35].

Percentiles length indicators analysis (Figure 2) show that, indeed the concentration is around the middle of the data.





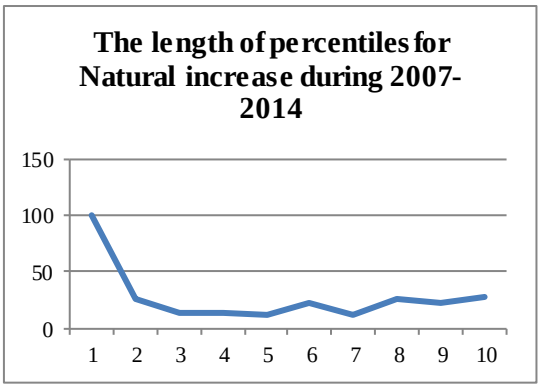


Figure 2

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 3.

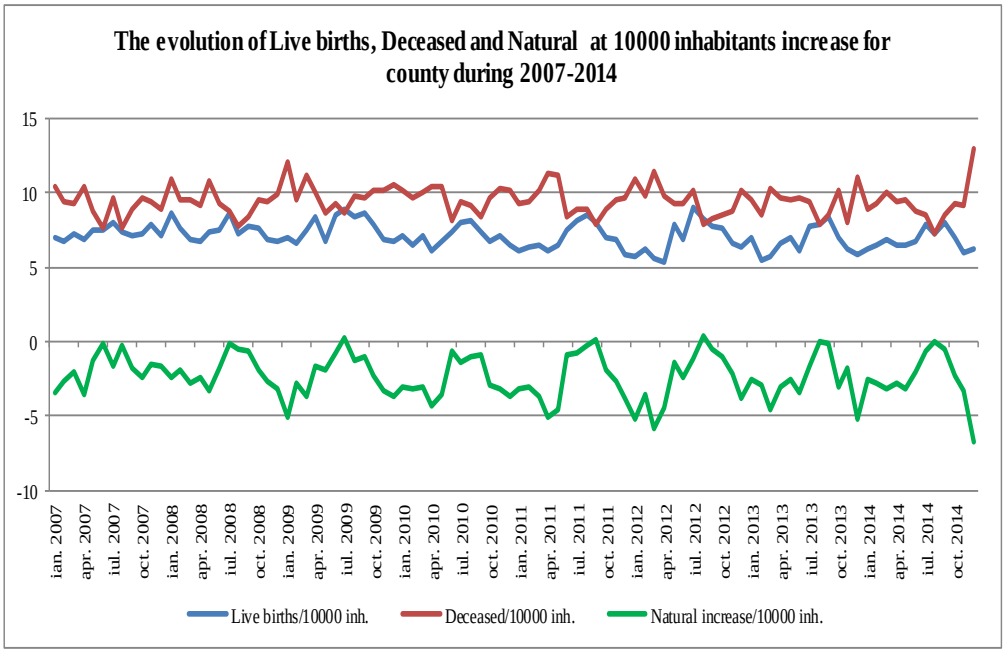


Figure 3

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.008705507x+7.537217105 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=-0.002037168x+9.569844298 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.006643041x+-2.033958333 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 7, for "Deceased/10000 inh." is 9 and for "Natural increase/10000 inh.": -2. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (5.34,6.53,7.03,7.75,8.98), for "Deceased/10000 inh.": (7.24,8.8325,9.47,10.1025,12.96) and for "Natural increase/10000 inh.": (-6.79,-3.2125,-2.435,-1.205,0.36).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (7,0.82), for "Deceased/10000 inh.": (9,0.99) and for "Natural increase/10000 inh.": (-2,1.48). This means that with a probability greather than 0.68 "Live births/10000 inh." are in the range [6,8], for "Deceased/10000 inh." in [8,10] and for "Natural increase/10000 inh." in [-3,-1].

Percentiles length indicators analysis (Figure 4) show that, indeed the concentration is around the middle of the data.

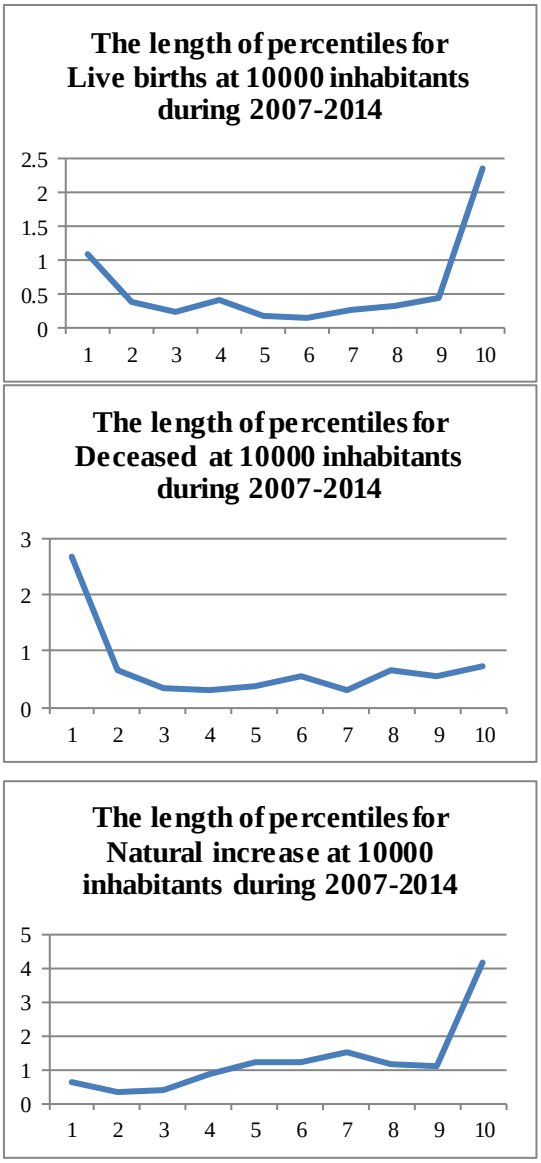


Figure 4

A comparison of the indicator "Live births" with the national level shows that it is worse than the national, being better only in 18.75% cases. For "Deceased" the indicator is about the same with the national, being better in 43.75% cases. Finally, for "Natural increase", the indicator is worse than the national, being better only in 18.75% cases.

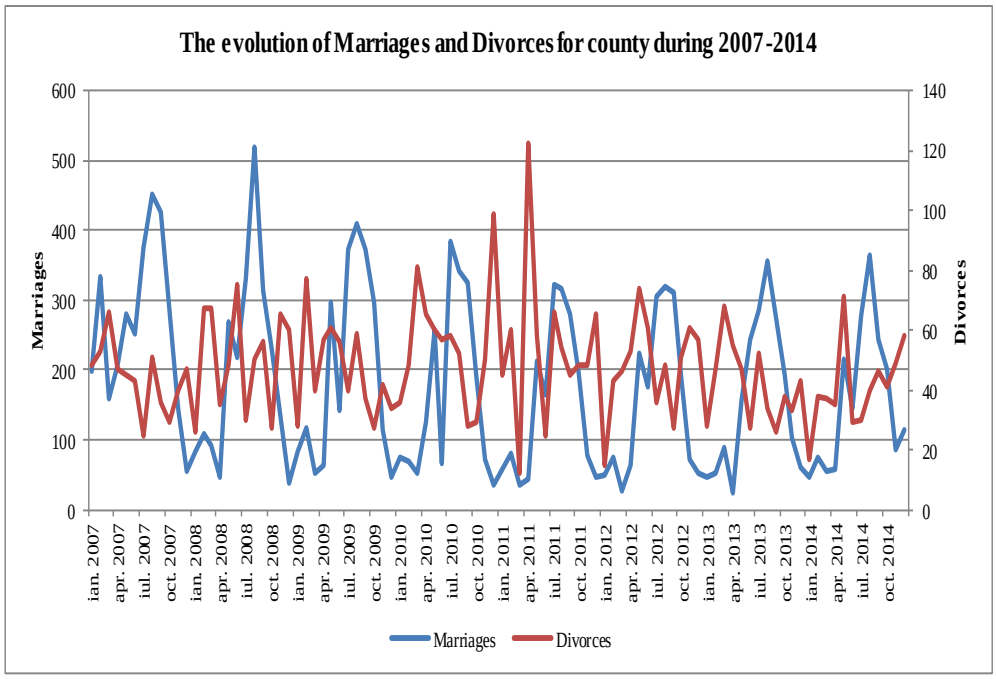


Figure 5

Regression analysis relative to indicator "Marriages" gives us an equation: y=-0.93859197x+226.7508772 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.063822572x+50.65789474 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages" is 157 and for "Divorces" is 47. Also, the distribution of quartiles is for "Marriages": (23,69.25,156.5,282.25,518) and for "Divorces": (12,35.75,47,58,122). The arithmetic mean and the standard deviation for "Marriages" are: (181,122.07) and for "Divorces": (48,17.33). This means that with a probability greather than 0.68 "Marriages" are in the range [59,303] and for "Divorces" in [31,65].

Percentiles length indicators analysis (Figure 6) show that, indeed the concentration is around the middle of the data.

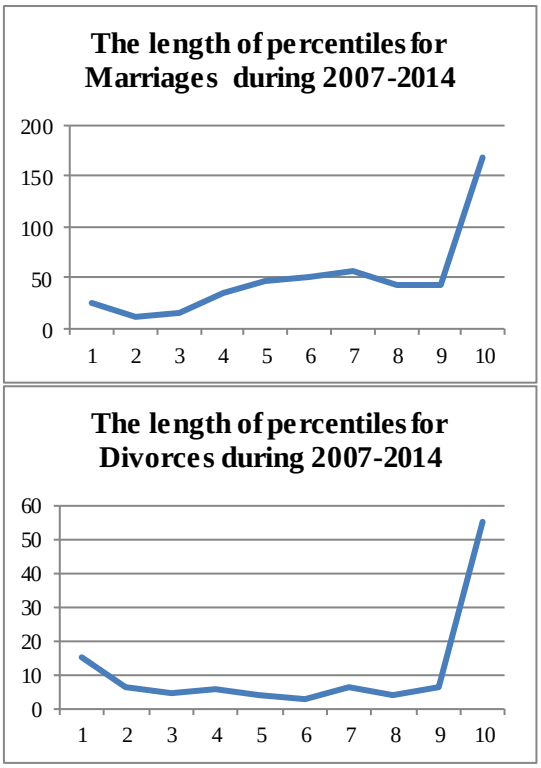


Figure 6

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 7.

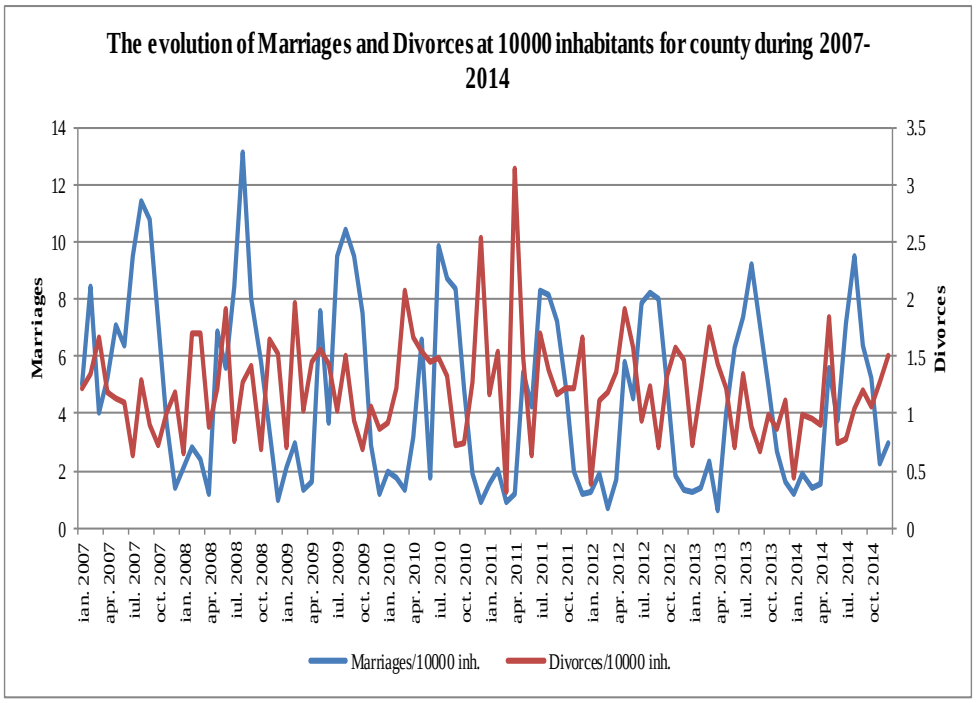


Figure 7

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.022499186x+5.737252193 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.001254544x+1.280949561 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 4 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (0.6,1.7725,4.01,7.235,13.17) and for "Divorces/10000 inh.": (0.31,0.91,1.22,1.4825,3.14). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (5,3.12) and for "Divorces/10000 inh.": (1,0.44). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [2,8] and for "Divorces/10000 inh." in [1,1].

Percentiles length indicators analysis (Figure 8) show that, indeed the concentration is around the middle of the data.

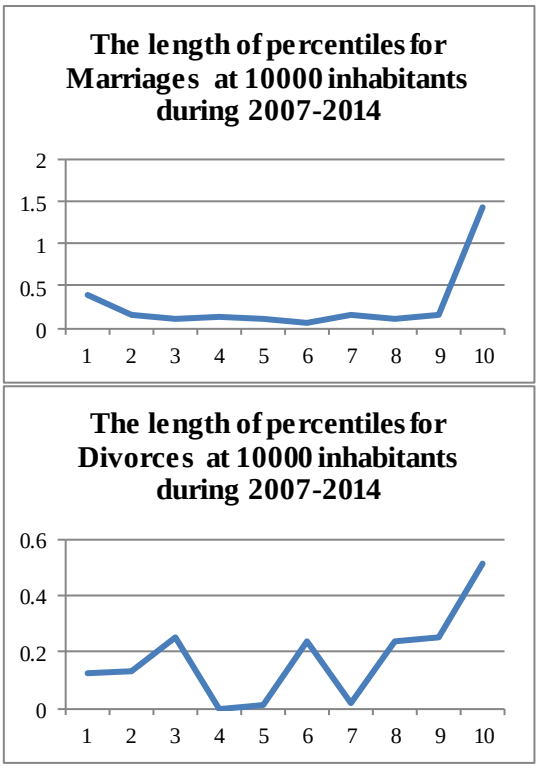


Figure 8

A comparison of the indicator "Marriages" with the national level shows that it is worse than the national, being better only in 37.5% cases. For "Divorces" the indicator is about the same with the national, being better in 45.83% cases.

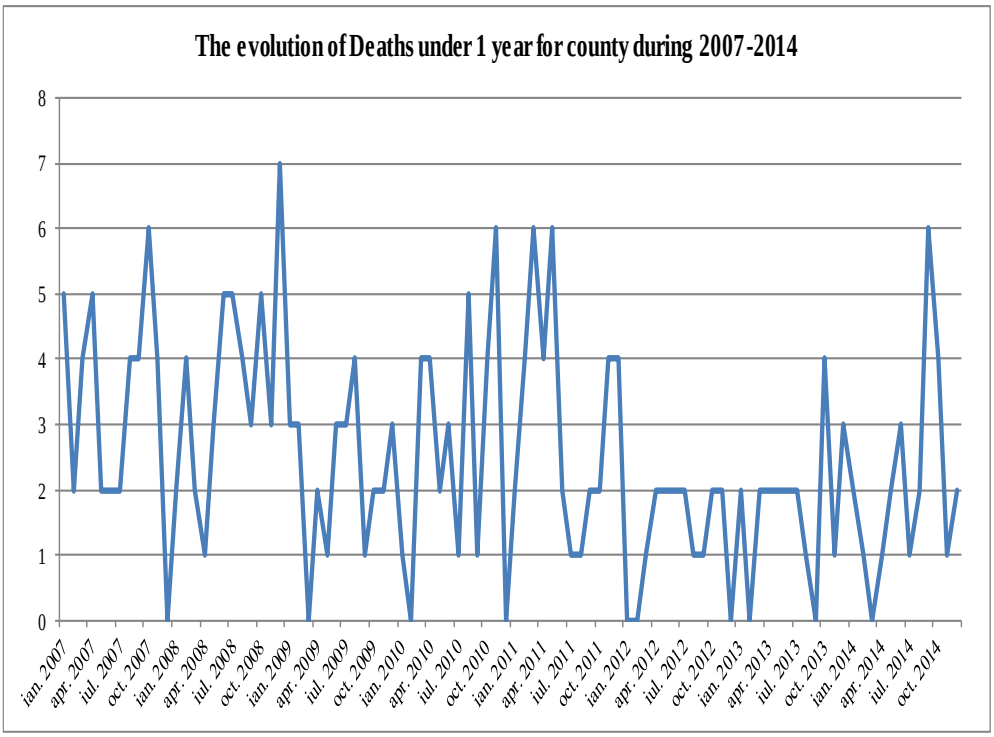


Figure 9

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.019187466x+3.441008772 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 2 and the distribution of quartiles is for "Deaths under 1 year": (0,1,2,4,7). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (3,1.66) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [1,5].

Percentiles length indicators analysis (Figure 10) show that, indeed the concentration is around the middle of the data.

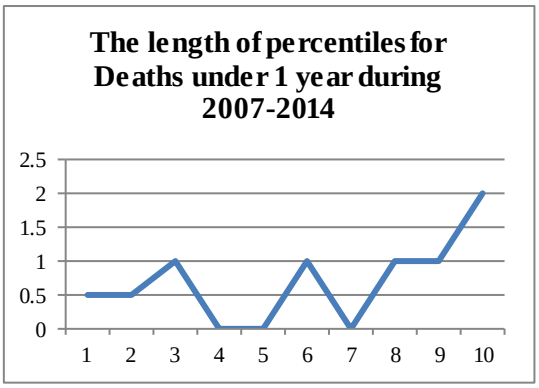


Figure 10

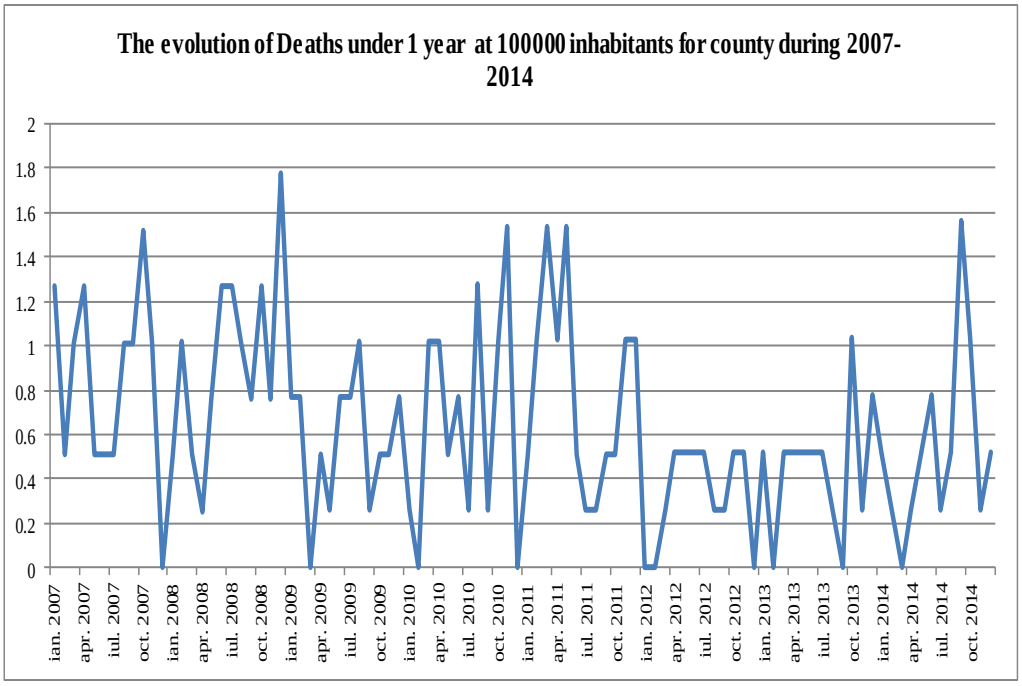


Figure 11

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.004714053x+0.872381579 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0,0.26,0.52,1.0125,1.78). The arithmetic mean and the standard deviation for

"Deaths under 1 year/100000 inh." are: (1,0.42) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is better than the national, being better in 67.71% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 6. The evolution of Alba County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	7699	-
2008	7573	-1.63
2009	7053	-6.87
2010	7330	3.93
2011	7004	-4.44
2012	7266	3.74
2013	7182	-1.16
2014	7486	4.24

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is a dependence of Deaths under 1 year from GDP offset by 2 years and the regression equation is:-5.1972dGDP+1.7042.

2.2. Analysis of Natural Movement of Arad County Population

Statistics of natural movement corresponding to Arad County are the following:

Table 7. The natural movement of Arad County population during 2007-2008

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,07	365	623	-258	238	106	3	ian,08	416	560	-144	101	44	5
feb,07	334	457	-123	509	32	4	feb,08	342	544	-202	177	29	4
mar,07	346	534	-188	328	107	3	mar,08	378	553	-175	187	49	3
apr,07	319	502	-183	251	104	2	apr,08	371	516	-145	105	88	4
mai,07	325	490	-165	337	90	2	mai,08	318	542	-224	299	118	2
iun,07	399	461	-62	357	112	4	iun,08	372	520	-148	278	60	6
iul,07	400	529	-129	417	43	4	iul,08	442	464	-22	406	24	4
aug,07	382	456	-74	500	11	6	aug,08	382	447	-65	567	128	4
sept,07	377	474	-97	393	42	4	sept,08	374	447	-73	408	55	2
oct,07	372	436	-64	311	77	6	oct,08	418	515	-97	262	16	5
nov,07	363	518	-155	227	105	3	nov,08	325	463	-138	176	27	3
dec,07	348	547	-199	108	107	4	dec,08	396	513	-117	102	153	5

Source: INSSE

Table 8. The natural movement of Arad County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	372	568	-196	114	53	2	ian,10	343	517	-174	91	0	2
feb,09	342	579	-237	161	36	3	feb,10	312	507	-195	133	66	2
mar,09	344	570	-226	103	4	2	mar,10	367	541	-174	106	25	3
apr,09	309	476	-167	115	146	4	apr,10	326	534	-208	197	44	3
mai,09	303	496	-193	305	30	2	mai,10	358	481	-123	276	58	3
iun,09	407	504	-97	241	84	2	iun,10	353	484	-131	209	79	2
iul,09	444	483	-39	385	24	4	iul,10	368	505	-137	390	26	5
aug,09	444	480	-36	470	15	3	aug,10	380	484	-104	444	41	3
sept,09	427	432	-5	344	28	4	sept,10	397	465	-68	300	41	4
oct,09	400	495	-95	282	50	2	oct,10	323	500	-177	272	90	2
nov,09	369	538	-169	150	19	7	nov,10	358	506	-148	106	71	4
dec,09	336	612	-276	99	117	5	dec,10	363	603	-240	80	52	9

Source: INSSE

Table 9.The natural movement of Arad County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	343	533	-190	92	0	4	ian,12	326	521	-195	100	0	1
feb,11	316	488	-172	110	89	0	feb,12	303	583	-280	109	41	8
mar,11	308	567	-259	90	66	7	mar,12	305	593	-288	94	151	4
apr,11	290	461	-171	116	34	1	apr,12	267	524	-257	109	92	2
mai,11	315	500	-185	229	128	5	mai,12	365	489	-124	206	62	5
iun,11	311	408	-97	253	56	3	iun,12	329	506	-177	264	74	3
iul,11	389	467	-78	380	54	5	iul,12	381	468	-87	292	38	4
aug,11	364	474	-110	401	99	4	aug,12	460	449	11	430	127	4
sept,11	387	427	-40	326	17	2	sept,12	354	384	-30	366	53	1

oct,11	315	484	-169	190	43	2	oct,12	413	470	-57	228	35	3
nov,11	345	489	-144	127	23	2	nov,12	315	478	-163	132	41	2
dec,11	295	540	-245	91	70	1	dec,12	278	514	-236	104	88	0

Source: INSSE

Table 10. The natural movement of Arad County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	394	532	-138	97	5	3	ian,14	323	519	-196	92	2	4
feb,13	243	464	-221	108	24	2	feb,14	287	485	-198	137	57	2
mar,13	263	514	-251	141	81	5	mar,14	317	506	-189	107	31	1
apr,13	307	522	-215	80	98	5	apr,14	312	491	-179	127	76	1
mai,13	276	503	-227	224	47	1	mai,14	298	491	-193	295	34	1
iun,13	324	496	-172	256	81	2	iun,14	360	441	-81	253	13	2
iul,13	379	402	-23	358	64	2	iul,14	404	444	-40	375	13	0
aug,13	342	479	-137	469	55	5	aug,14	423	425	-2	493	51	5
sept,13	371	447	-76	292	23	2	sept,14	343	424	-81	332	64	6
oct,13	338	492	-154	206	30	4	oct,14	350	518	-168	272	23	4
nov,13	311	457	-146	142	87	1	nov,14	311	516	-205	129	30	4
dec,13	297	541	-244	76	105	1	dec,14	342	518	-176	105	77	4

Source: INSSE

Table 11. The population trends of Arad County during 2007-2014

Year	Population	Year	Population
2007	481419	2011	480473
2008	481638	2012	479332
2009	481765	2013	478166
2010	480805	2014	476767

Source: INSSE

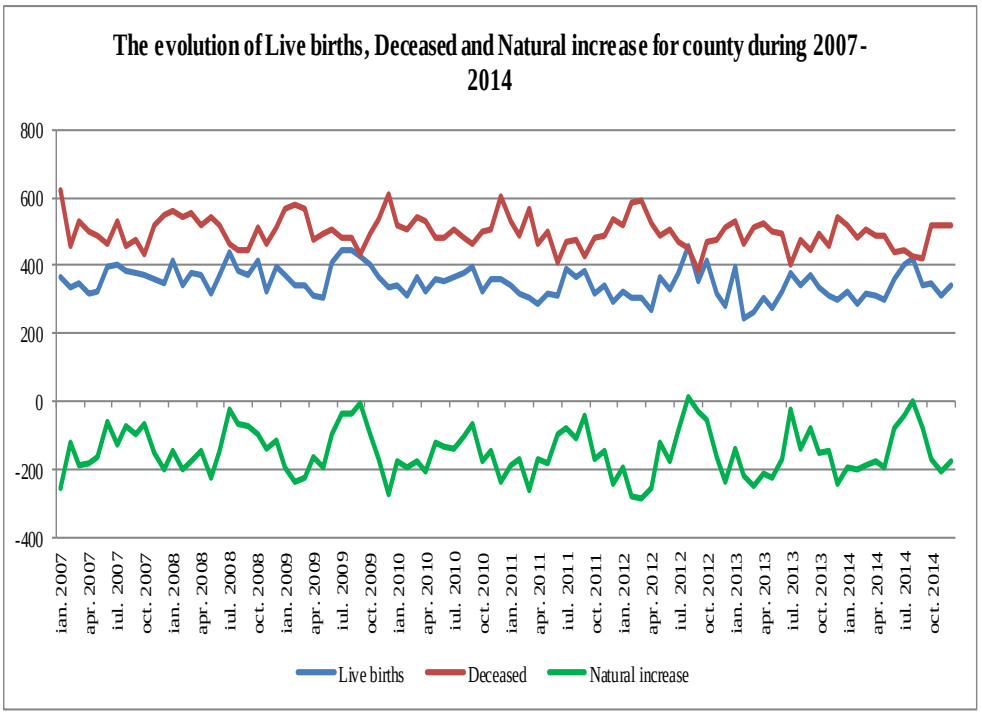


Figure 12

From figure 12 we can see a sinusoidal evolution of the indicator. Except months aug 2012 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-0.504815518x+374.4627193 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=-0.377095768x+517.4037281 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Natural increase" gives us an equation: y=-0.12771975x+-142.9410088 where x is the number of month (Jan, 2007=1), therefore a downward trend.

For the set of values above, the median indicator for "Live births" is 346, for "Deceased" is 498 and for "Natural increase": -164. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (243,315.75,345.5,378.25,460), for "Deceased": (384,467.75,498,522.5,623) and

for "Natural increase": (-288,-195.25,-164,-97,11). The arithmetic mean and the standard deviation for "Live births" are: (350,43.59), for "Deceased": (499,45.66) and for "Natural increase": (-149,69.71). This means that with a probability greather than 0.68 "Live births" are in the range [306,394], for "Deceased" in [453,545] and for "Natural increase" in [-219,-79]. Percentiles length indicators analysis (Figure 13) show that, indeed the concentration is around the middle of the data.

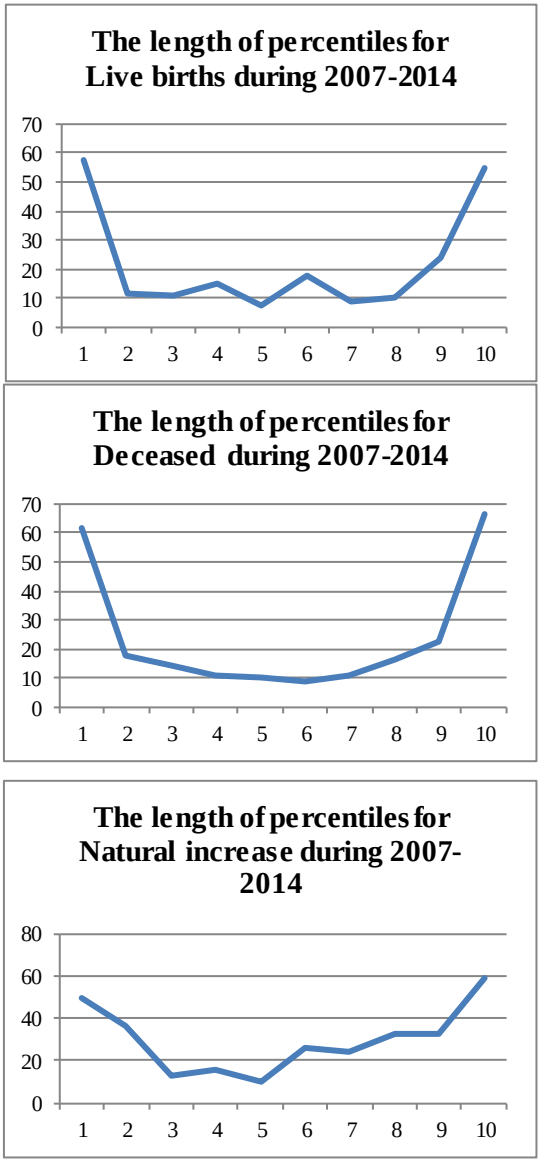


Figure 13

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 14.

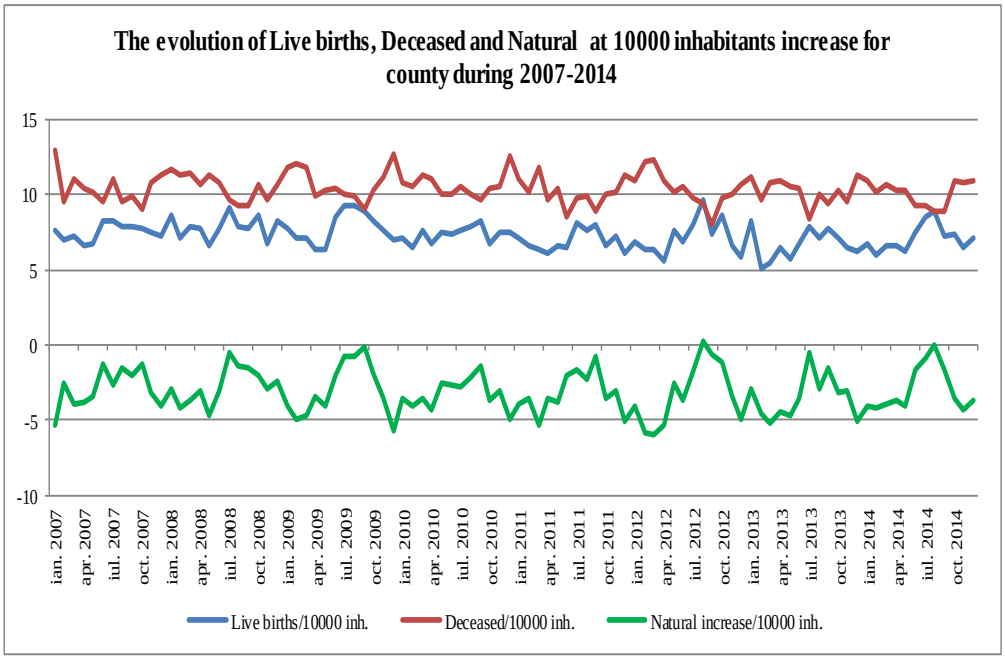


Figure 14

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.009682244x+7.759067982 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=-0.006654097x+10.71897368 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.00301153x+-2.961024123 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

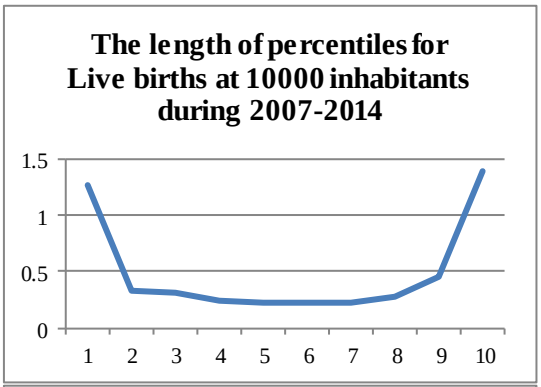
For the set of values above, the median indicator for "Live births/10000 inh." is 7, for "Deceased/10000 inh." is 10 and for "Natural increase/10000 inh.": -3. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

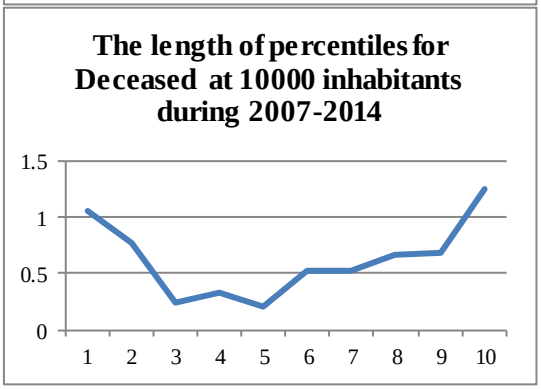
Also, the distribution of quartiles is for "Live births/10000 inh.": (5.08,6.5775,7.19,7.8625,9.6), for "Deceased/10000 inh.":

(8.01,9.75,10.385,10.9225,12.94) and for "Natural increase/10000 inh.": (-6.01,-4.07,-3.415,-2.01,0.23).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (7,0.9), for "Deceased/10000 inh.": (10,0.94) and for "Natural increase/10000 inh.": (-3,1.45). This means that with a probability greather than 0.68 "Live births/10000 inh." are in the range [6,8], for "Deceased/10000 inh." in [9,11] and for "Natural increase/10000 inh." in [-4,-2].

Percentiles length indicators analysis (Figure 15) show that, indeed the concentration is around the middle of the data.





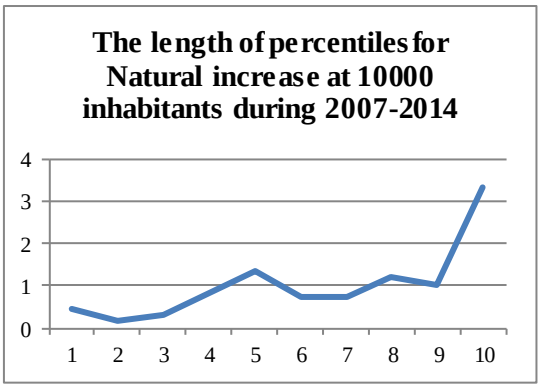


Figure 15

A comparison of the indicator "Live births" with the national level shows that it is worse than the national, being better only in 20.83% cases. For "Deceased" the indicator is worse than the national, being better only in 2.08% cases. Finally, for "Natural increase", the indicator is worse than the national, being better only in 2.08% cases.

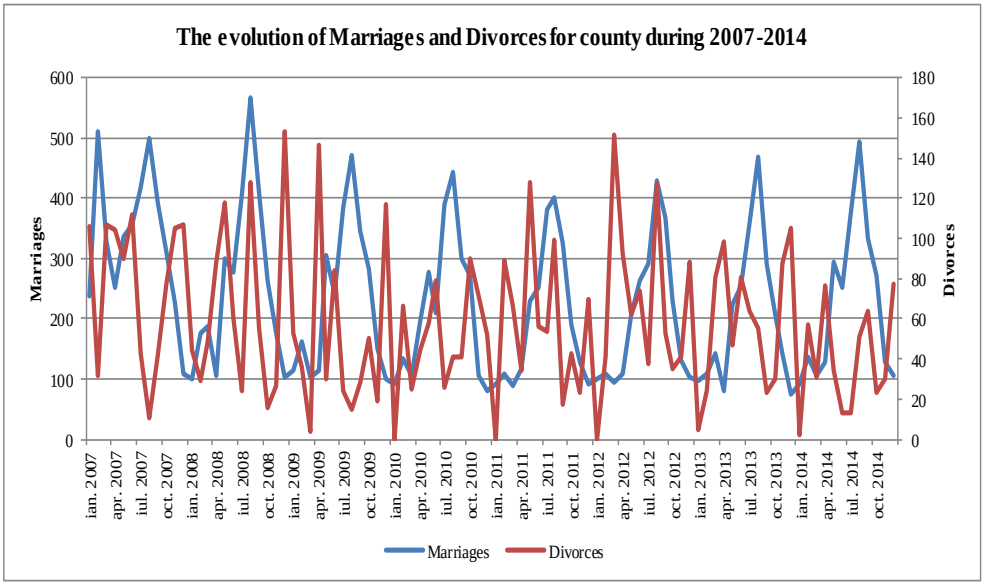


Figure 16

Regression analysis relative to indicator "Marriages" gives us an equation: y=-0.958518719x+280.0506579 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.225583288x+69.04495614 where x is the number of month (Jan, 2007=1), therefore a downward trend.

For the set of values above, the median indicator for "Marriages" is 226 and for "Divorces" is 53. Also, the distribution of quartiles is for "Marriages": (76,109,225.5,326.5,567) and for "Divorces": (0,29.75,52.5,84.75,153). The arithmetic mean and the standard deviation for "Marriages" are: (234,125.89) and for "Divorces": (58,36.9). This means that with a probability greather than 0.68 "Marriages" are in the range [108,360] and for "Divorces" in [21,95].

Percentiles length indicators analysis (Figure 17) show that, indeed the concentration is around the middle of the data.

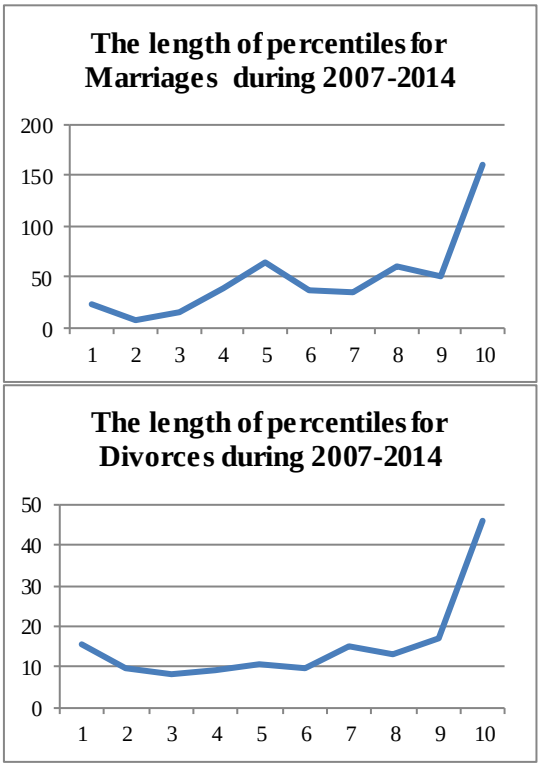


Figure 17

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 18.

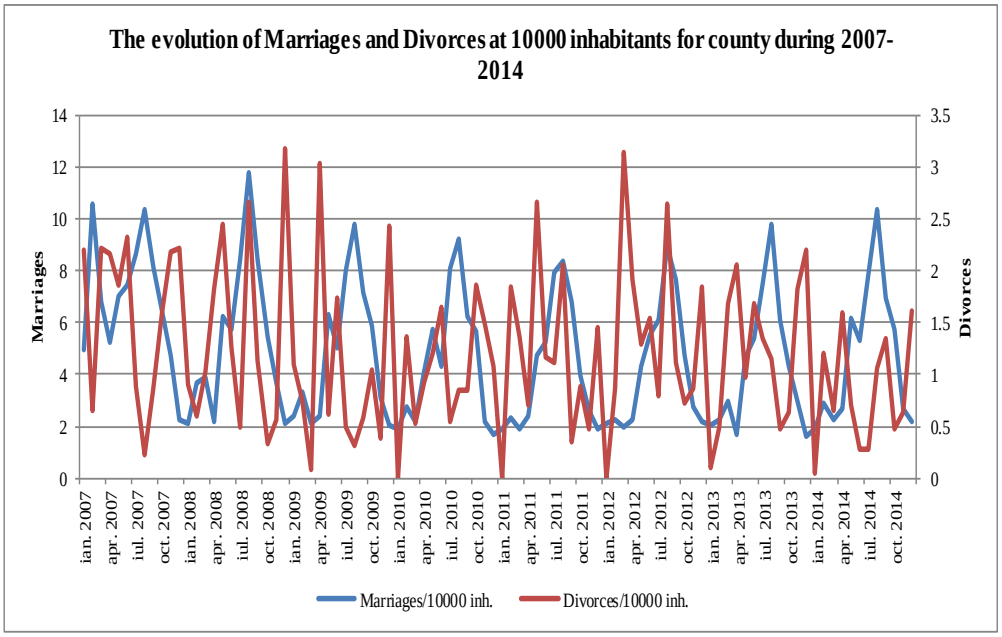


Figure 18

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.019355806x+5.802506579 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.004564162x+1.430945175 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 5 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (1.59,2.27,4.7,6.7875,11.77) and for "Divorces/10000 inh.": (0,0.615,1.09,1.76,3.18). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (5,2.62) and for "Divorces/10000 inh.": (1,0.77). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [2,8] and for "Divorces/10000 inh." in [0,2].

Percentiles length indicators analysis (Figure 19) show that, indeed the concentration is around the middle of the data.

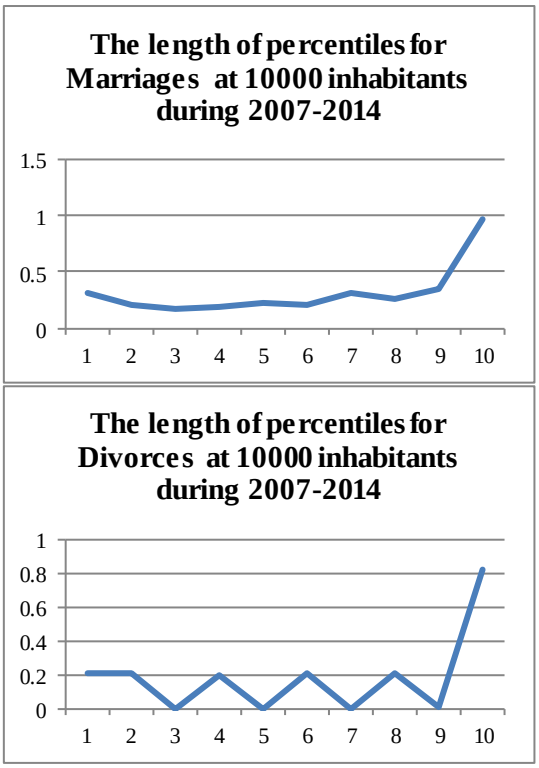


Figure 19

A comparison of the indicator "Marriages" with the national level shows that it is better than the national, being better in 61.46% cases. For "Divorces" the indicator is about the same with the national, being better in 51.04% cases.

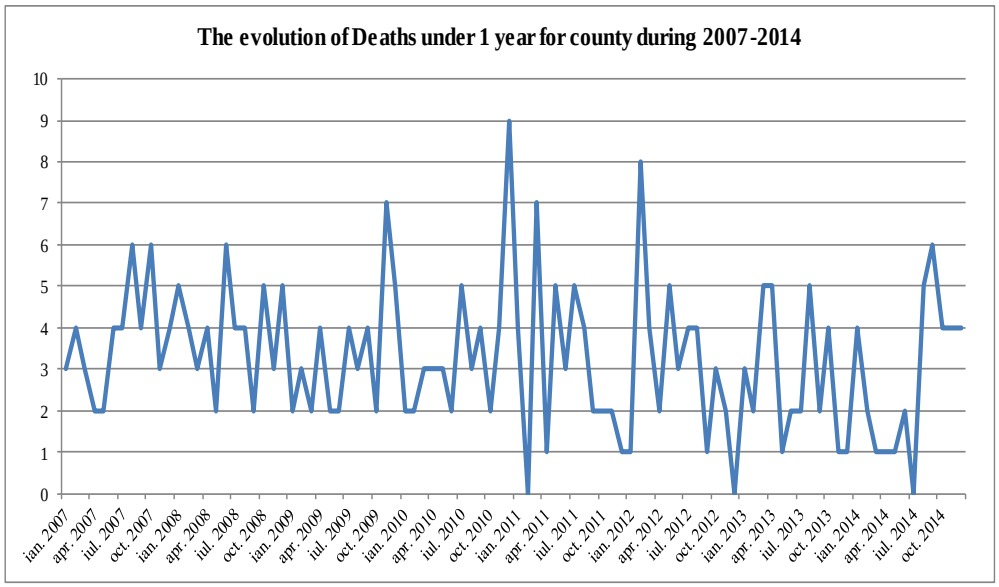


Figure 20

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.012357569x+3.870175439 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 3 and the distribution of quartiles is for "Deaths under 1 year": (0,2,3,4,9). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (3,1.72) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [1,5]. Percentiles length indicators analysis (Figure 21) show that, indeed the concentration is around the middle of the data.

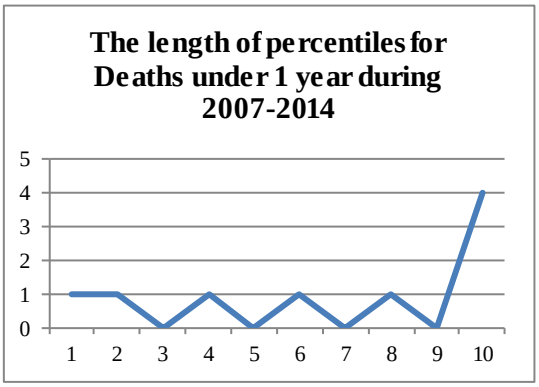


Figure 21

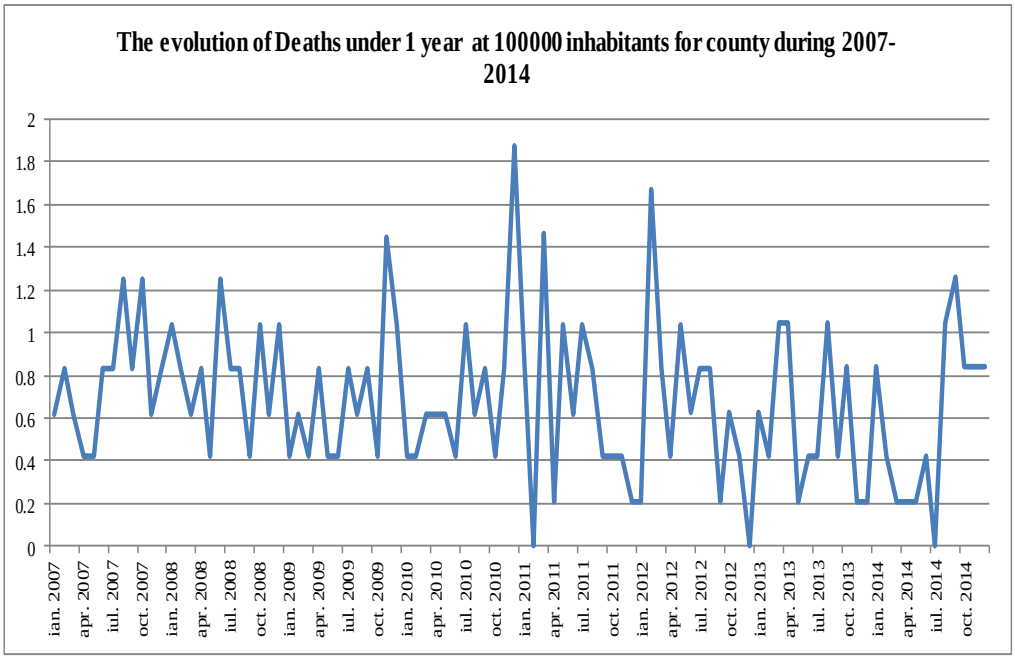


Figure 22

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.002489148x+0.802598684 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0,0.42,0.62,0.84,1.87). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.36) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is better than the national, being better in 62.5% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 12. The evolution of Arad County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	9296	-
2008	9678	4.11
2009	9078	-6.19
2010	9153	0.82
2011	9335	1.99
2012	9324	-0.12
2013	9478	1.65
2014	9398	-0.85

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is not a dependence of the variation of GDP.

2.3. Analysis of Natural Movement of Arges County Population

Statistics of natural movement corresponding to Arges County are the following:

Table 13. The natural movement of Arges County population during 2007-2008

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,07	484	773	-289	374	117	4	ian,08	515	697	-182	137	7	12
feb,07	464	618	-154	543	102	5	feb,08	436	651	-215	163	94	8
mar,07	468	673	-205	255	81	10	mar,08	436	619	-183	157	93	5
apr,07	427	596	-169	358	102	6	apr,08	455	633	-178	84	36	1
mai,07	502	603	-101	281	101	10	mai,08	428	591	-163	383	111	8
iun,07	502	541	-39	479	106	7	iun,08	487	559	-72	458	89	5
iul,07	572	597	-25	700	8	16	iul,08	549	529	20	659	62	8
aug,07	507	490	17	691	10	5	aug,08	474	537	-63	842	70	4
sept,07	507	507	0	763	78	2	sept,08	546	506	40	611	63	8
oct,07	505	553	-48	511	123	6	oct,08	533	638	-105	451	62	10
nov,07	460	635	-175	246	131	5	nov,08	478	671	-193	231	83	3
dec,07	486	682	-196	140	119	9	dec,08	478	654	-176	125	86	1

Source: INSSE

Table 14. The natural movement of Arges County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	451	674	-223	130	23	4	ian,10	466	680	-214	140	14	7
feb,09	407	544	-137	150	79	2	feb,10	426	635	-209	103	138	4
mar,09	484	702	-218	75	69	4	mar,10	522	709	-187	53	80	8
apr,09	490	622	-132	170	87	5	apr,10	475	637	-162	279	139	8
mai,09	472	595	-123	306	131	6	mai,10	427	656	-229	284	141	4
iun,09	530	559	-29	343	51	4	iun,10	551	659	-108	152	120	1
iul,09	571	539	32	658	87	7	iul,10	554	567	-13	668	40	4
aug,09	551	539	12	785	39	2	aug,10	487	535	-48	611	141	5
sept,09	560	527	33	626	105	3	sept,10	535	551	-16	573	93	6
oct,09	572	612	-40	445	45	5	oct,10	460	648	-188	402	32	8
nov,09	489	625	-136	192	32	9	nov,10	502	583	-81	132	63	5
dec,09	489	714	-225	116	84	3	dec,10	472	668	-196	90	126	7

Source: INSSE

Table 15. The natural movement of Arges County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	432	667	-235	93	17	9	ian,12	476	647	-171	102	11	0
feb,11	410	666	-256	92	117	1	feb,12	399	663	-264	91	78	1
mar,11	445	765	-320	56	140	4	mar,12	407	763	-356	64	89	1
apr,11	416	639	-223	101	102	4	apr,12	363	655	-292	176	93	6
mai,11	433	621	-188	191	105	3	mai,12	475	607	-132	212	92	4
iun,11	467	569	-102	365	109	8	iun,12	414	530	-116	308	111	7
iul,11	499	581	-82	646	44	3	iul,12	489	567	-78	529	24	3
aug,11	491	562	-71	551	162	6	aug,12	521	532	-11	579	147	5

sept,11	502	533	-31	511	88	2	sept,12	490	469	21	592	95	4
oct,11	452	635	-183	329	95	4	oct,12	472	622	-150	346	59	4
nov,11	385	616	-231	113	95	1	nov,12	435	600	-165	138	110	8
dec,11	435	661	-226	75	145	4	dec,12	428	621	-193	104	68	6

Source: INSSE

Table 16. The natural movement of Arges County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	471	648	-177	83	21	4	ian,14	409	624	-215	94	10	2
feb,13	379	537	-158	80	117	7	feb,14	374	596	-222	98	85	2
mar,13	371	656	-285	113	87	3	mar,14	405	700	-295	95	88	5
apr,13	361	568	-207	68	55	3	apr,14	457	616	-159	143	65	2
mai,13	386	594	-208	207	153	5	mai,14	400	601	-201	283	60	1
iun,13	402	556	-154	386	89	5	iun,14	439	534	-95	337	97	5
iul,13	489	570	-81	453	48	2	iul,14	494	552	-58	526	65	4
aug,13	416	559	-143	668	92	4	aug,14	428	523	-95	666	119	5
sept,13	491	588	-97	443	52	2	sept,14	541	524	17	443	67	4
oct,13	462	621	-159	325	81	6	oct,14	492	658	-166	356	36	5
nov,13	414	575	-161	141	33	7	nov,14	411	616	-205	134	77	3
dec,13	431	710	-279	99	58	4	dec,14	409	692	-283	127	52	3

Source: INSSE

Table 17. The population trends of Arges County during 2007-2014

Year	Population	Year	Population
2007	664403	2011	660054
2008	665041	2012	657426
2009	664279	2013	654670
2010	662359	2014	651930

Source: INSSE

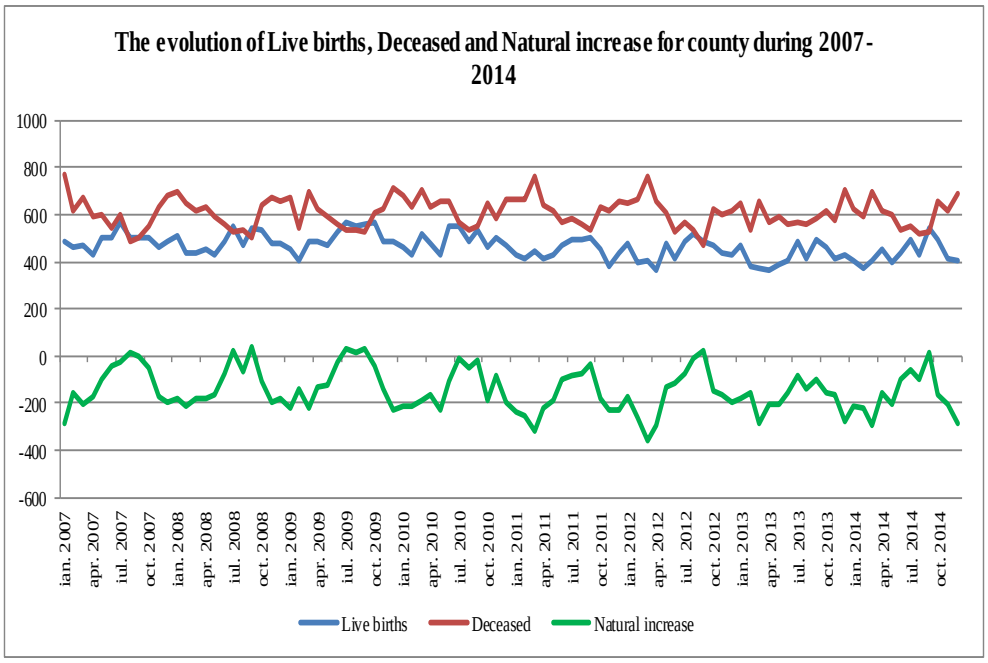


Figure 23

From figure 23 we can see a sinusoidal evolution of the indicator. Except months aug 2007, sept 2007, iul 2008, sept 2008, iul 2009, aug 2009, sept 2009, sept 2012, sept 2014 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-0.804164406x+504.7311404 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=-0.121622355x+615.7111842 where x is the number of month (Jan, 2007=1), therefore a downward trend.

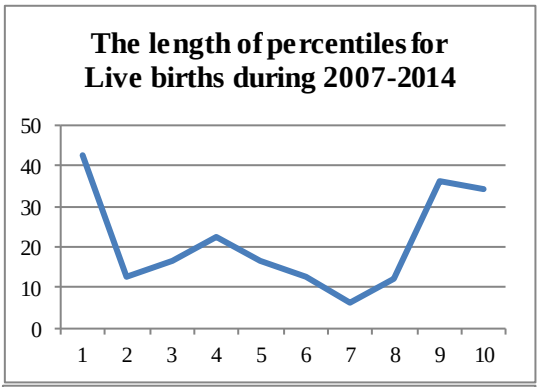
Regression analysis relative to indicator "Natural increase" gives us an equation: y=-0.682542051x+-110.9800439 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

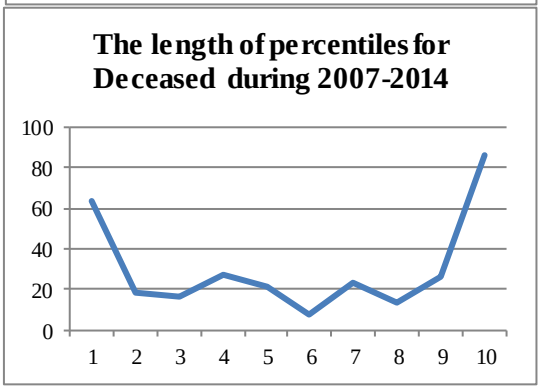
For the set of values above, the median indicator for "Live births" is 472, for "Deceased" is 616 and for "Natural increase": -162. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (361,427.75,471.5,495.25,572), for "Deceased": (469,559,616,655.25,773) and for "Natural increase": (-356,-207.25,-161.5,-80.25,40).

The arithmetic mean and the standard deviation for "Live births" are: (466,50.99), for "Deceased": (610,62.75) and for "Natural increase": (-144,90.58). This means that with a probability greather than 0.68 "Live births" are in the range [415,517], for "Deceased" in [547,673] and for "Natural increase" in [-235,-53].

Percentiles length indicators analysis (Figure 24) show that, indeed the concentration is around the middle of the data.





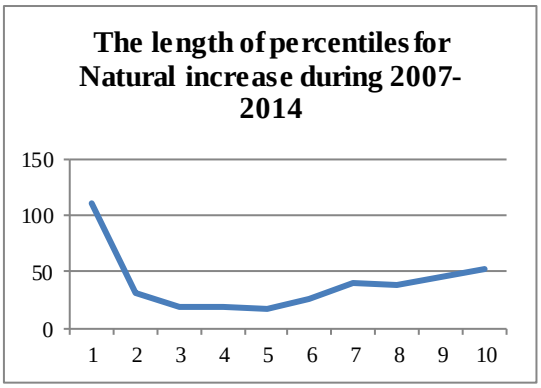


Figure 24

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 25.

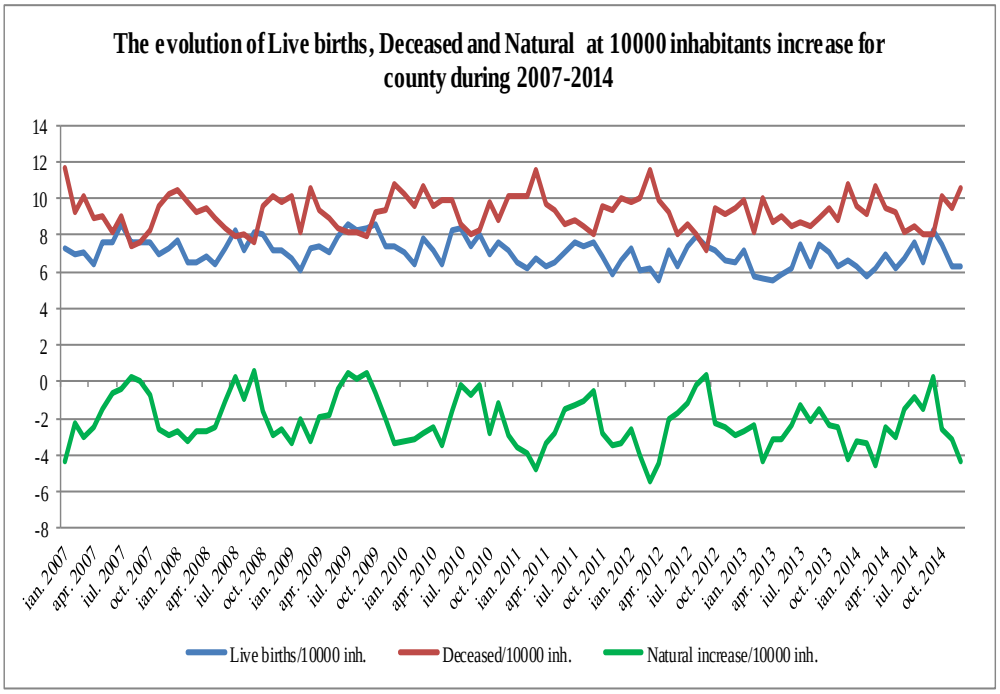


Figure 25

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.010516617x+7.564118421 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=0.000356959x+9.221958333 where x is the number of month (Jan, 2007=1), therefore a very small upward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.010872626x+-1.658510965 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 7, for "Deceased/10000 inh." is 9 and for "Natural increase/10000 inh.": -2. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (5.51,6.4475,7.12,7.56,8.61), for "Deceased/10000 inh.": (7.13,8.485,9.305,9.9125,11.63) and for "Natural increase/10000 inh.": (-5.42,-3.16,-2.45,-1.2125,0.6).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (7,0.75), for "Deceased/10000 inh.": (9,0.95) and for "Natural increase/10000 inh.": (-2,1.38). This means that with a probability greather than 0.68 "Live births/10000 inh." are in the range [6,8], for "Deceased/10000 inh." in [8,10] and for "Natural increase/10000 inh." in [-3,-1].

Percentiles length indicators analysis (Figure 26) show that, indeed the concentration is around the middle of the data.

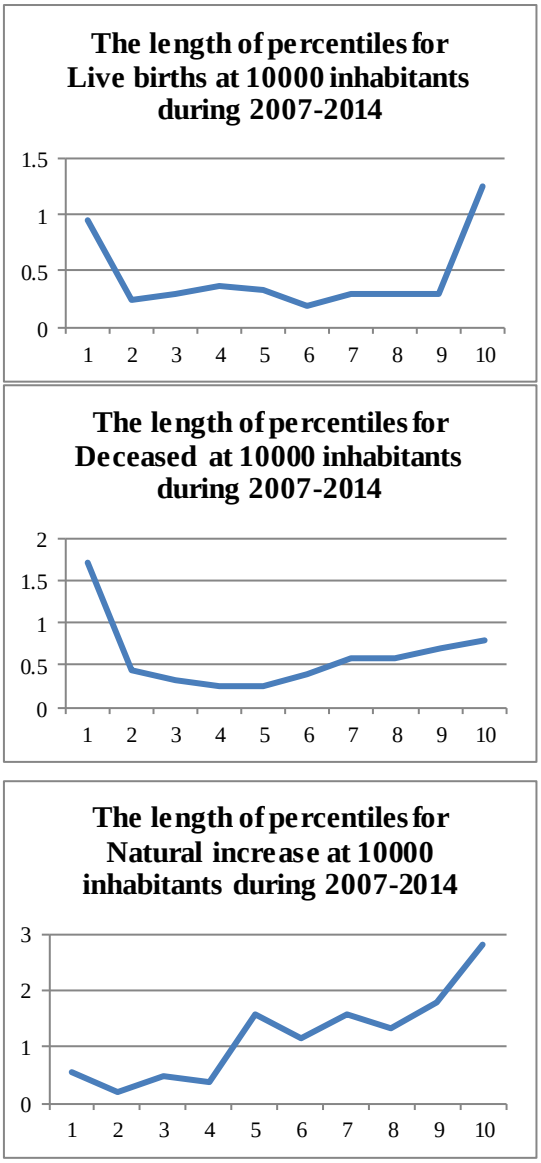


Figure 26

A comparison of the indicator "Live births" with the national level shows that it is worse than the national, being better only in 10.42% cases. For "Deceased" the indicator is better than the national, being better in 61.46% cases. Finally, for "Natural increase", the indicator is worse than the national, being better only in 23.96% cases.

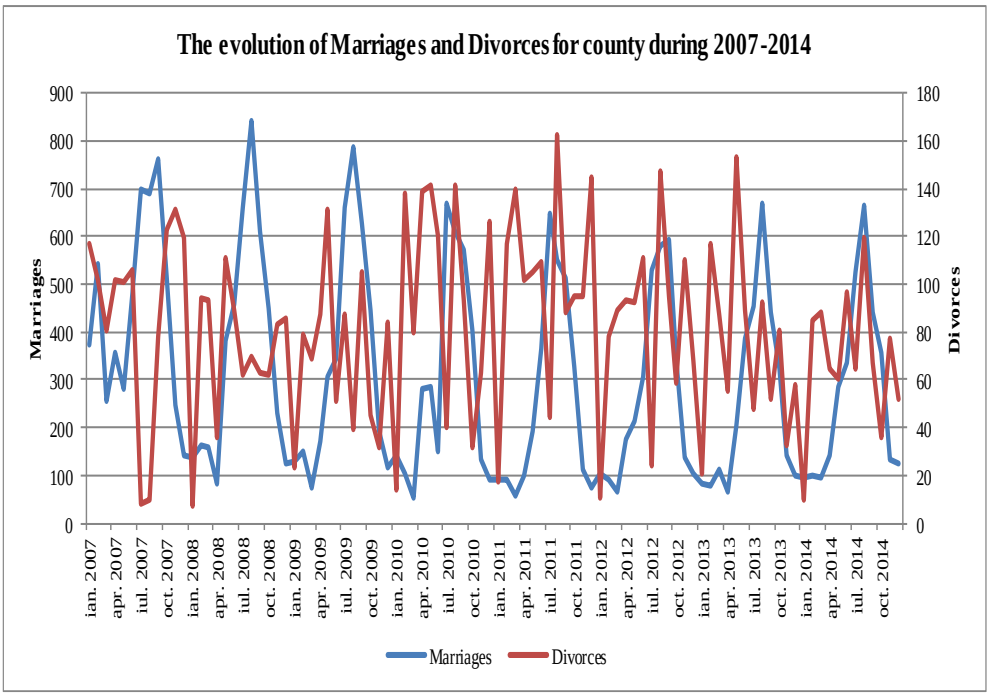


Figure 27

Regression analysis relative to indicator "Marriages" gives us an equation: y=-1.601770212x+388.6962719 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.079517092x+85.06491228 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages" is 267 and for "Divorces" is 87. Also, the distribution of quartiles is for "Marriages": (53,122.75,267,463.25,842) and for "Divorces": (7,57.25,86.5,105.25,162). The arithmetic mean and the standard deviation for "Marriages" are: (311,214.81) and for "Divorces": (81,37.34). This means that with a probability greather than 0.68 "Marriages" are in the range [96,526] and for "Divorces" in [44,118].

Percentiles length indicators analysis (Figure 28) show that, indeed the concentration is around the middle of the data.

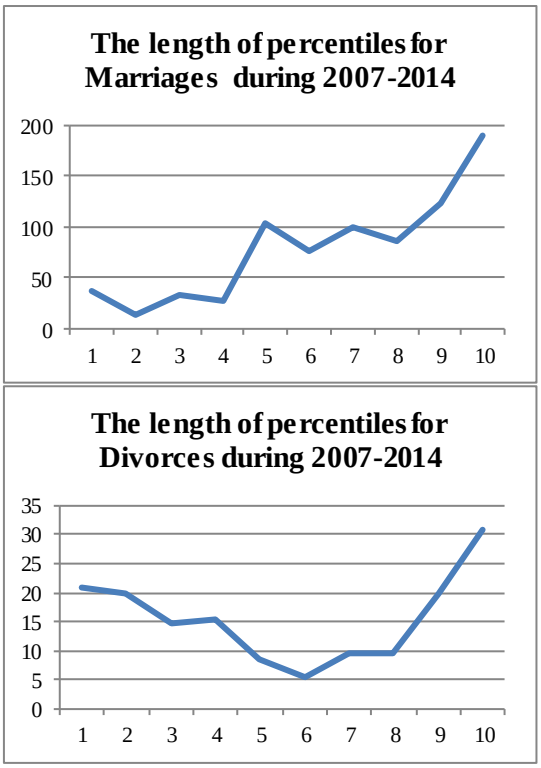


Figure 28

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 29.

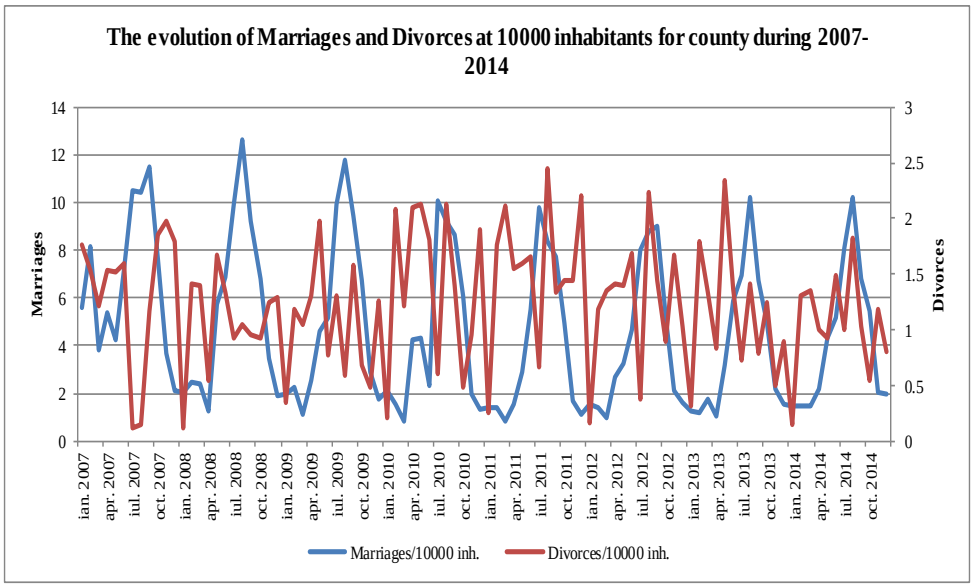


Figure 29

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.023099905x+5.828157895 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.000928039x+1.275322368 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 4 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (0.8,1.8475,4.025,6.9925,12.66) and for "Divorces/10000 inh.": (0.11,0.8775,1.305,1.5925,2.45). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (5,3.25) and for "Divorces/10000 inh.": (1,0.56). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [2,8] and for "Divorces/10000 inh." in [0,2].

Percentiles length indicators analysis (Figure 30) show that, indeed the concentration is around the middle of the data.

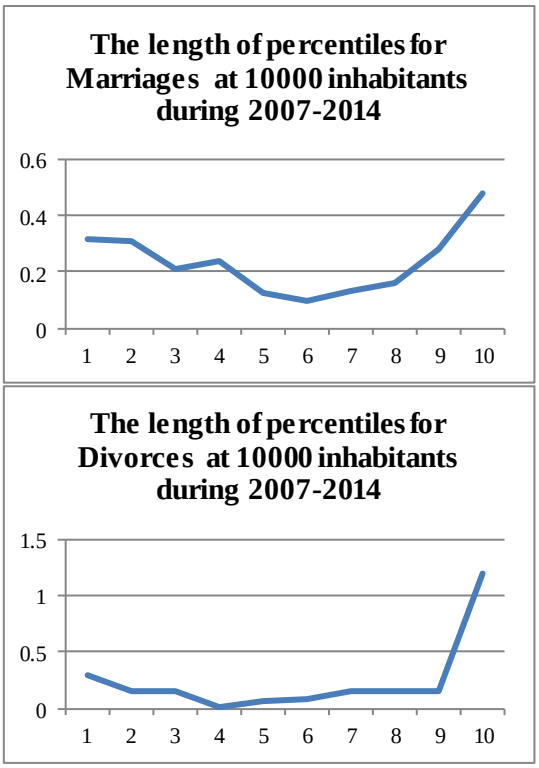


Figure 30

A comparison of the indicator "Marriages" with the national level shows that it is worse than the national, being better only in 35.42% cases. For "Divorces" the indicator is about the same with the national, being better in 46.88% cases.

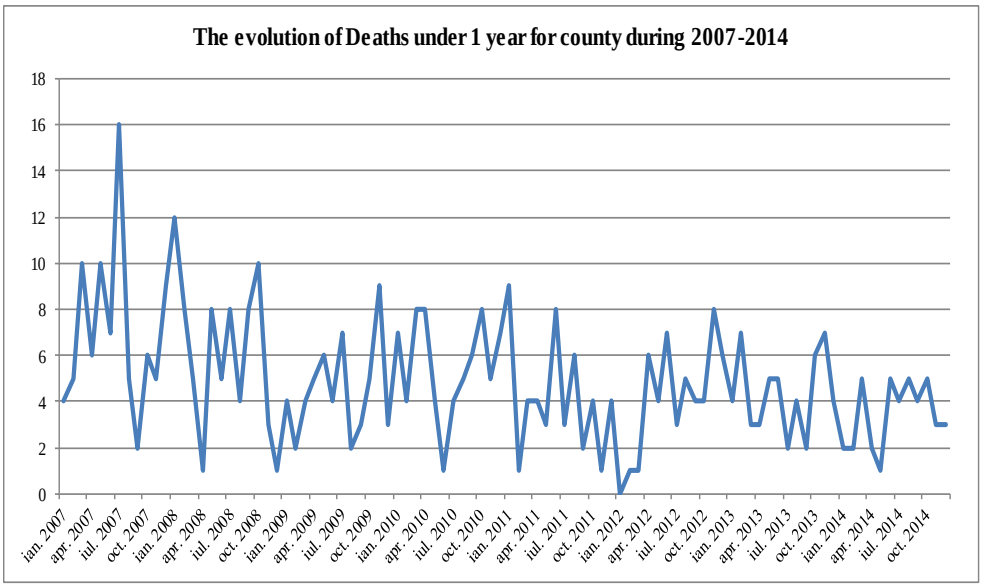


Figure 31

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.035824742x+6.633333333 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 5 and the distribution of quartiles is for "Deaths under 1 year": (0,3,4.5,6.25,16). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (5,2.71) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [2,8]. Percentiles length indicators analysis (Figure 32) show that, indeed the concentration is around the middle of the data.

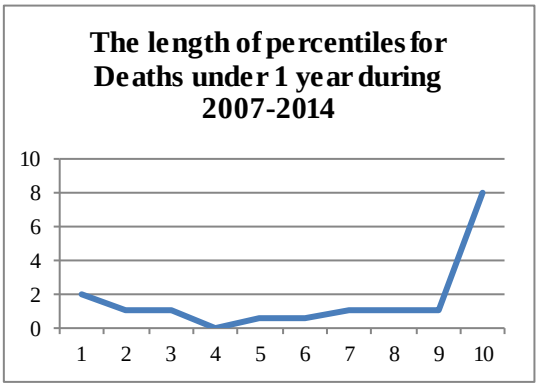


Figure 32

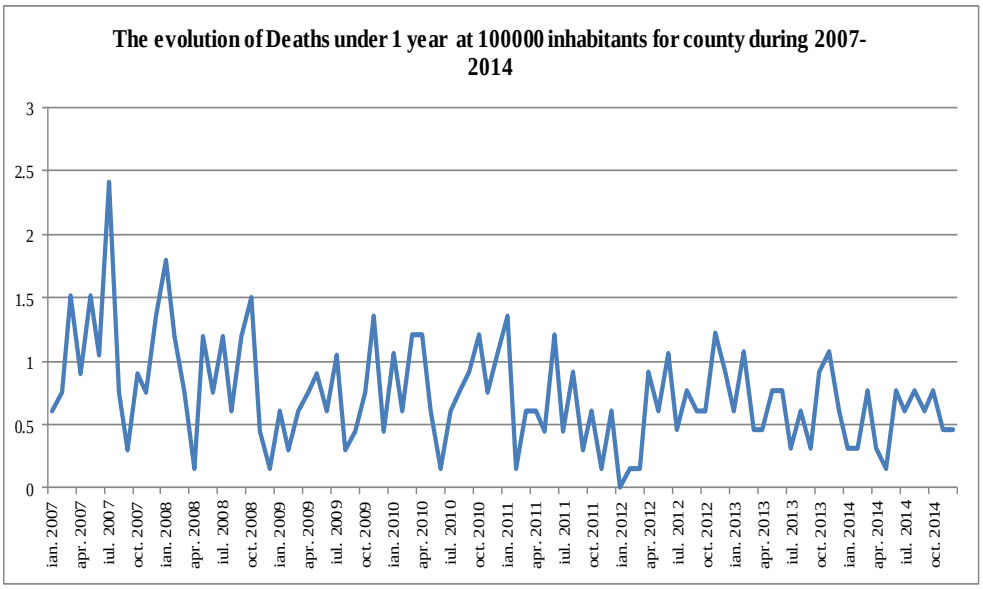


Figure 33

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.00521663x+0.993214912 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0,0.46,0.68,0.9525,2.41). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.41) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is about the same with the national, being better in 58.33% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 18. The evolution of Arges County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	13829	-
2008	14629	5.79
2009	14746	0.8
2010	13098	-11.18
2011	12557	-4.13

2012	11310	-9.93
2013	11682	3.29
2014	12157	4.07

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is a dependence of Live births from GDP offset by 1 year and the regression equation is: 0.6594dGDP+0.1414. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is a dependence of Natural increase from GDP offset by 2 years and the regression equation is: 3.0586dGDP+23.8927. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is not a dependence of the variation of GDP.

2.4. Analysis of Natural Movement of Bacau County Population

Statistics of natural movement corresponding to Bacau County are the following:

Table 19. The natural movement of Bacau County population during 2007-2008

Month	Live births	Deceased	Natural increas	Marriages	Divorce	Deaths under 1 year	Month	Live births	Deceased	Natural increas	Marriages	Divorce	Deaths under 1 year
ian,07	674	926	-252	490	126	11	ian,08	785	807	-22	243	204	14
feb,07	576	691	-115	808	157	12	feb,08	651	699	-48	217	193	8
mar,07	637	666	-29	368	144	11	mar,08	629	696	-67	181	154	8
apr,07	628	658	-30	454	114	12	apr,08	625	675	-50	152	181	9
mai,07	690	698	-8	386	150	7	mai,08	665	673	-8	359	178	5
iun,07	668	543	125	415	117	6	iun,08	592	610	-18	360	147	11
iul,07	768	619	149	682	94	11	iul,08	724	623	101	570	158	3
aug,07	753	577	176	1143	129	9	aug,08	700	564	136	1297	159	2
sept,07	724	602	122	609	48	7	sept,08	739	669	70	498	33	7
oct,07	689	660	29	433	45	8	oct,08	717	689	28	394	75	7

nov,07	606	756	-150	318	130	9	nov,08	507	659	-152	246	134	5
dec,07	654	758	-104	235	145	6	dec,08	617	778	-161	181	180	9

Source: INSSE

Table 20. The natural movement of Bacau County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	684	825	-141	204	201	13	ian,10	596	841	-245	187	138	8
feb,09	509	638	-129	197	140	7	feb,10	536	732	-196	146	122	5
mar,09	601	787	-186	122	129	6	mar,10	594	771	-177	103	207	10
apr,09	510	670	-160	153	134	6	apr,10	579	716	-137	228	186	4
mai,09	598	636	-38	363	113	4	mai,10	510	701	-191	330	112	7
iun,09	566	654	-88	277	121	7	iun,10	634	660	-26	139	127	1
iul,09	747	629	118	630	134	8	iul,10	628	660	-32	595	111	6
aug,09	798	604	194	1178	99	2	aug,10	817	724	93	1095	103	6
sept,09	717	556	161	493	32	5	sept,10	637	634	3	434	28	6
oct,09	692	727	-35	390	23	9	oct,10	579	738	-159	312	49	8
nov,09	573	730	-157	180	56	8	nov,10	627	707	-80	158	92	11
dec,09	577	816	-239	160	121	8	dec,10	581	737	-156	137	123	11

Source: INSSE

Table 21. The natural movement of Bacau County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	598	839	-241	133	125	10	ian,12	541	773	-232	164	135	10
feb,11	509	695	-186	138	89	8	feb,12	498	861	-363	107	99	7
mar,11	502	755	-253	80	119	5	mar,12	467	857	-390	64	82	10
apr,11	451	662	-211	121	136	1	apr,12	468	709	-241	126	82	9
mai,11	547	701	-154	226	161	6	mai,12	622	671	-49	202	102	7
iun,11	503	627	-124	247	150	6	iun,12	584	646	-62	272	110	3
iul,11	638	609	29	509	161	9	iul,12	642	639	3	477	101	9
aug,11	855	602	253	978	125	6	aug,12	855	586	269	947	64	5
sept,11	608	568	40	410	38	5	sept,12	581	535	46	469	53	2
oct,11	539	620	-81	247	83	6	oct,12	628	642	-14	231	61	9
nov,11	565	704	-139	127	97	11	nov,12	512	562	-50	130	65	7
dec,11	556	751	-195	125	131	5	dec,12	482	823	-341	153	166	6

Source: INSSE

Table 22. The natural movement of Bacau County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	623	747	-124	102	128	4	ian,14	567	774	-207	132	103	4
feb,13	446	676	-230	111	92	6	feb,14	472	666	-194	164	85	3
mar,13	420	769	-349	130	90	5	mar,14	485	744	-259	114	94	3
apr,13	469	807	-338	76	137	5	apr,14	482	780	-298	135	100	4
mai,13	551	706	-155	204	123	3	mai,14	498	710	-212	276	97	2
iun,13	499	647	-148	285	107	3	iun,14	557	675	-118	278	71	5
iul,13	700	622	78	442	79	6	iul,14	675	613	62	522	96	4
aug,13	749	618	131	1021	66	4	aug,14	764	635	129	106	86	7

sept,13	620	601	19	356	55	4	sept,14	694	633	61	37	69	4
oct,13	633	730	-97	262	47	5	oct,14	574	667	-93	26	52	2
nov,13	478	693	-215	156	37	5	nov,14	510	702	-192	15	78	5
dec,13	455	816	-361	150	111	6	dec,14	499	802	-303	15	70	6

Source: INSSE

Table 23. The population trends of Bacau County during 2007-2014

Year	Population	Year	Population
2007	760651	2011	754964
2008	760013	2012	753218
2009	759080	2013	751354
2010	757825	2014	749179

Source: INSSE

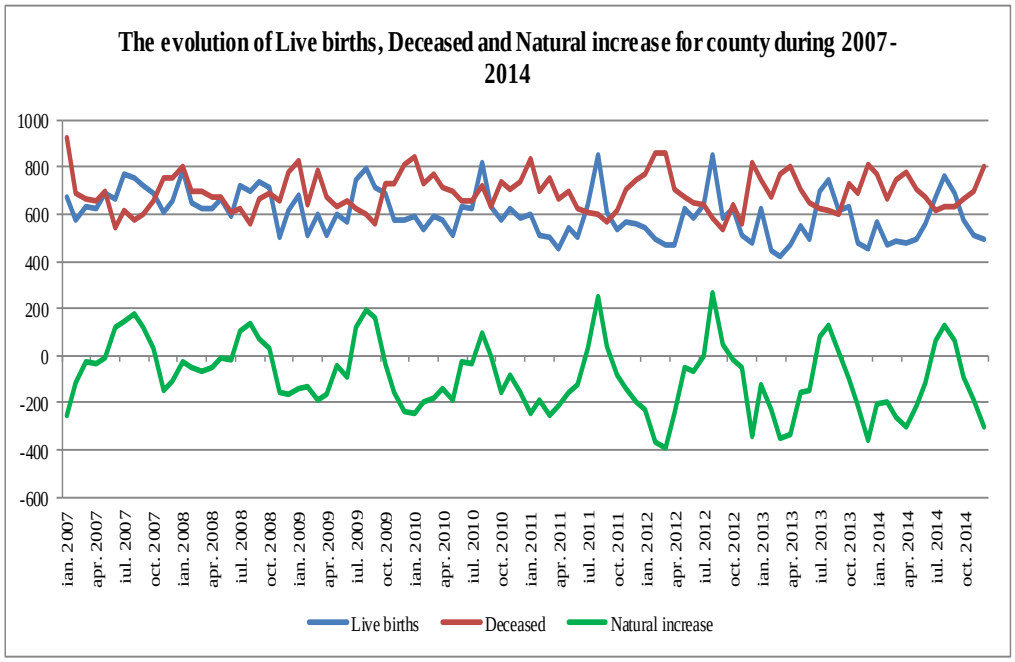


Figure 34

From figure 34 we can see a sinusoidal evolution of the indicator. Except months iun 2007, iul 2007, aug 2007, sept 2007, oct 2007, iul 2008, aug 2008, sept 2008, oct 2008, iul 2009, aug 2009, sept 2009, aug 2010, sept 2010, iul 2011, aug 2011, sept 2011, iul 2012, aug 2012, sept 2012, iul 2013, aug 2013, sept 2013, iul 2014, aug 2014, sept 2014 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-1.399233587x+672.8524123 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=0.130039338x+685.9743421 where x is the number of month (Jan, 2007=1), therefore an upward trend.

Regression analysis relative to indicator "Natural increase" gives us an equation: y=-1.529272925x+-13.12192982 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

For the set of values above, the median indicator for "Live births" is 598, for "Deceased" is 683 and for "Natural increase": -101. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (420,511.5,598,669.5,855), for "Deceased": (535,634.75,682.5,744.75,926) and for "Natural increase": (-390,-192.5,-100.5,7,269).

The arithmetic mean and the standard deviation for "Live births" are: (605,97.79), for "Deceased": (692,79.39) and for "Natural increase": (-87,146.45). This means that with a probability greather than 0.68 "Live births" are in the range [507,703], for "Deceased" in [613,771] and for "Natural increase" in [-233,59].

Percentiles length indicators analysis (Figure 35) show that, indeed the concentration is around the middle of the data.

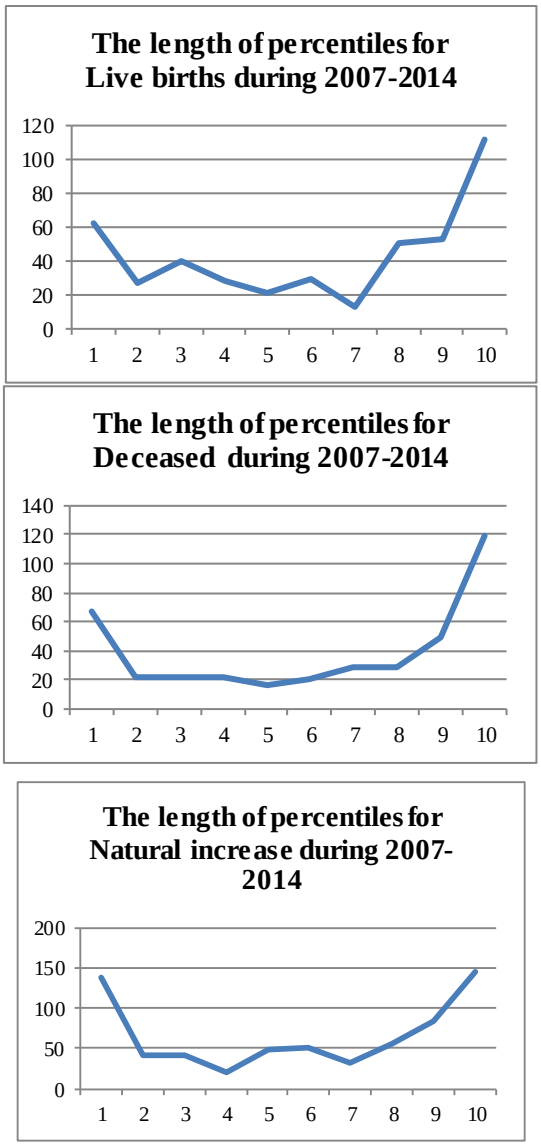


Figure 35

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 36.

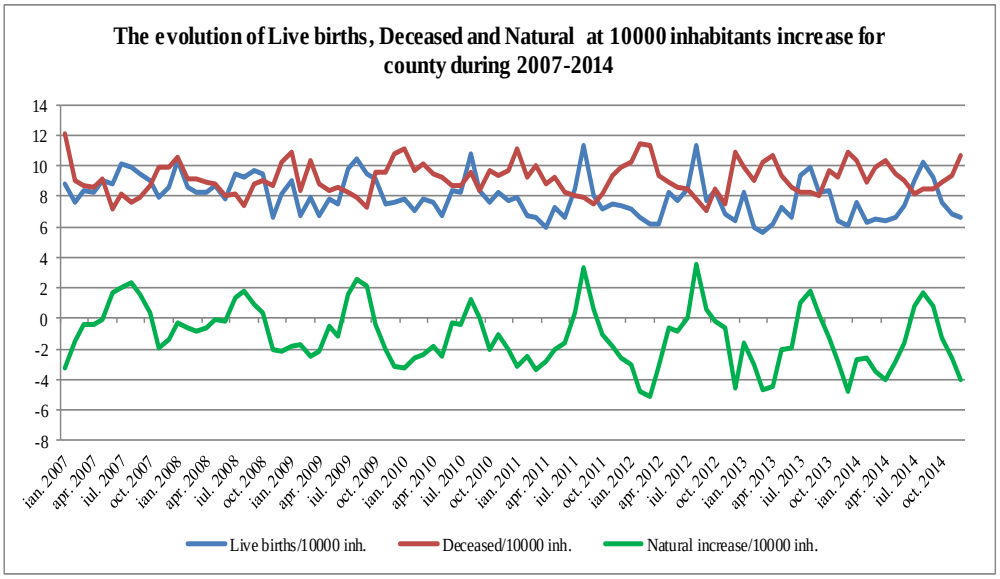


Figure 36

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.017030453x+8.828164474 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=0.003409794x+8.995666667 where x is the number of month (Jan, 2007=1), therefore an upward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.020425733x+-0.16758114 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 8, for "Deceased/10000 inh." is 9 and for "Natural increase/10000 inh.": -1. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (5.59,6.8075,7.9,8.8,11.35), for "Deceased/10000 inh.": (7.1,8.395,9.04,9.9325,12.17) and for "Natural increase/10000 inh.": (-5.18,-2.565,-1.33,0.0925,3.57).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (8,1.28), for "Deceased/10000 inh.": (9,1.05) and for "Natural increase/10000 inh.": (-1,1.94). This means that with a probability greather than 0.68 "Live births/10000

inh." are in the range [7,9], for "Deceased/10000 inh." in [8,10] and for "Natural increase/10000 inh." in [-3,1].

Percentiles length indicators analysis (Figure 37) show that, indeed the concentration is around the middle of the data.

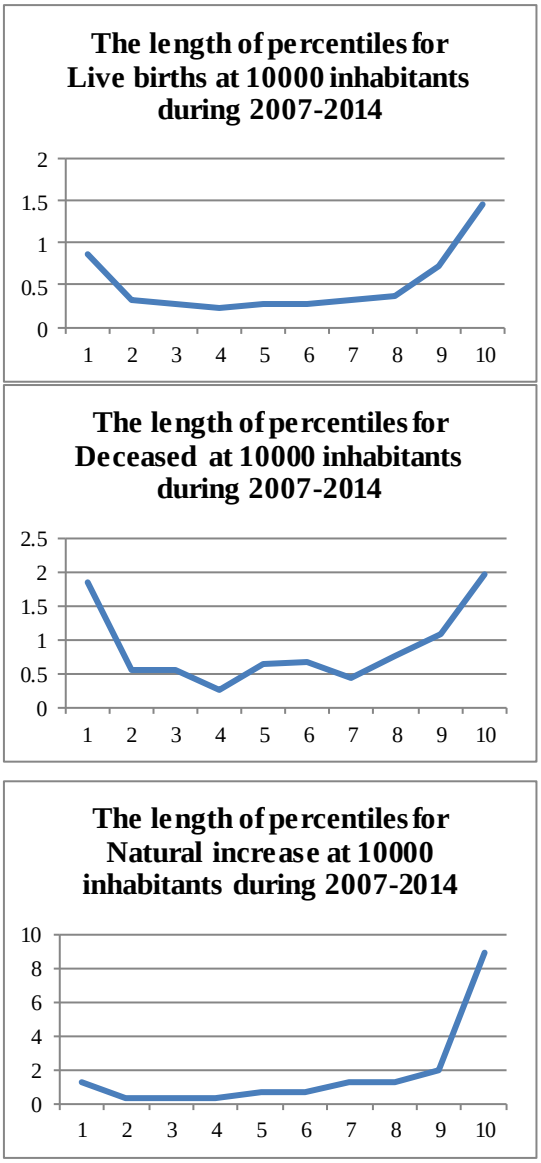


Figure 37

A comparison of the indicator "Live births" with the national level shows that it is better than the national, being better in 69.79% cases. For "Deceased" the indicator is better than the national, being better in 67.71% cases. Finally, for "Natural increase", the indicator is better than the national, being better in 72.92% cases.

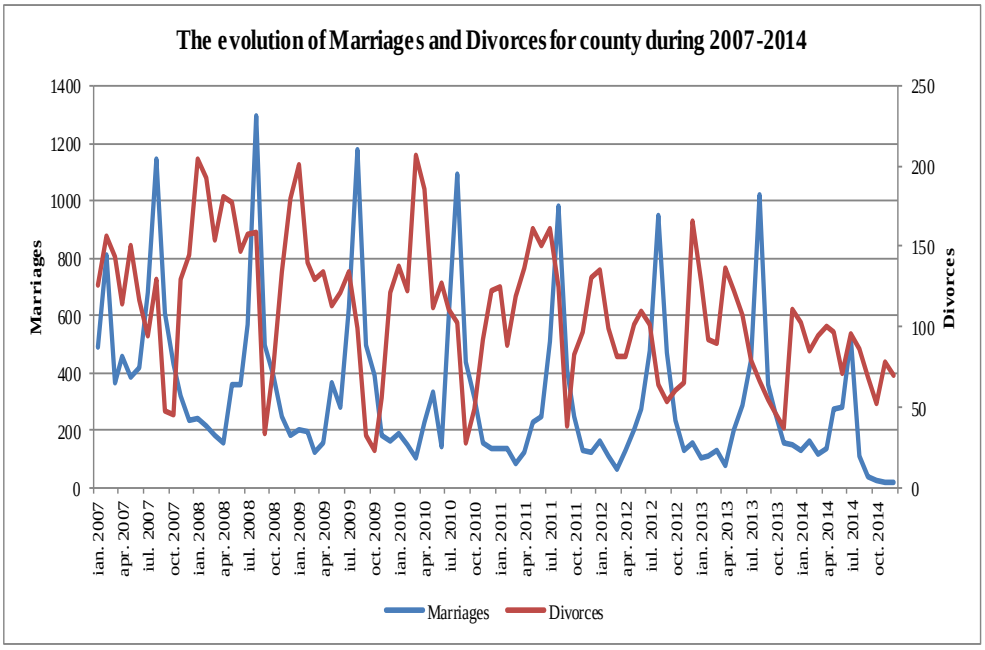


Figure 38

Regression analysis relative to indicator "Marriages" gives us an equation: y=-3.264134563x+481.727193 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.646907216x+140.7916667 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

For the set of values above, the median indicator for "Marriages" is 233 and for "Divorces" is 111. Also, the distribution of quartiles is for "Marriages": (15,137.75,233,419.5,1297) and for "Divorces": (23,81.25,111,135.25,207). The arithmetic mean and the standard deviation for "Marriages" are: (323,270.8) and for "Divorces": (109,42.73). This means that with a probability greather than 0.68 "Marriages" are in the range [52,594] and for "Divorces" in [66,152].

Percentiles length indicators analysis (Figure 39) show that, indeed the concentration is around the middle of the data.

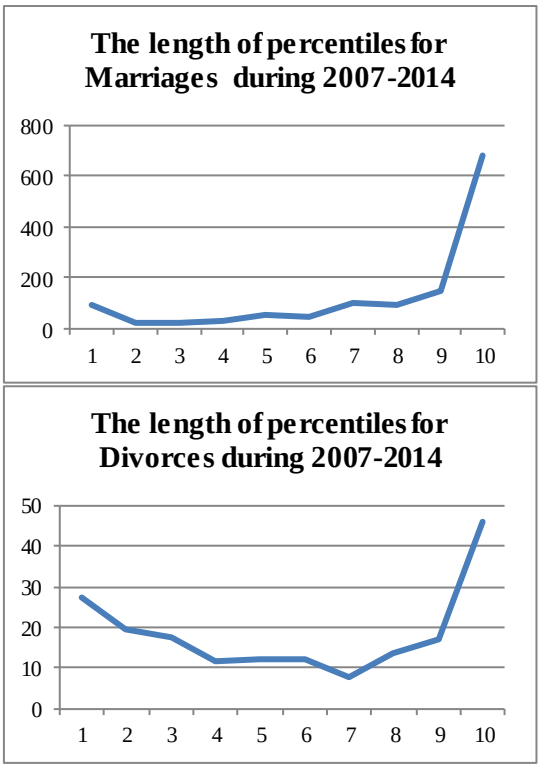


Figure 39

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 40.

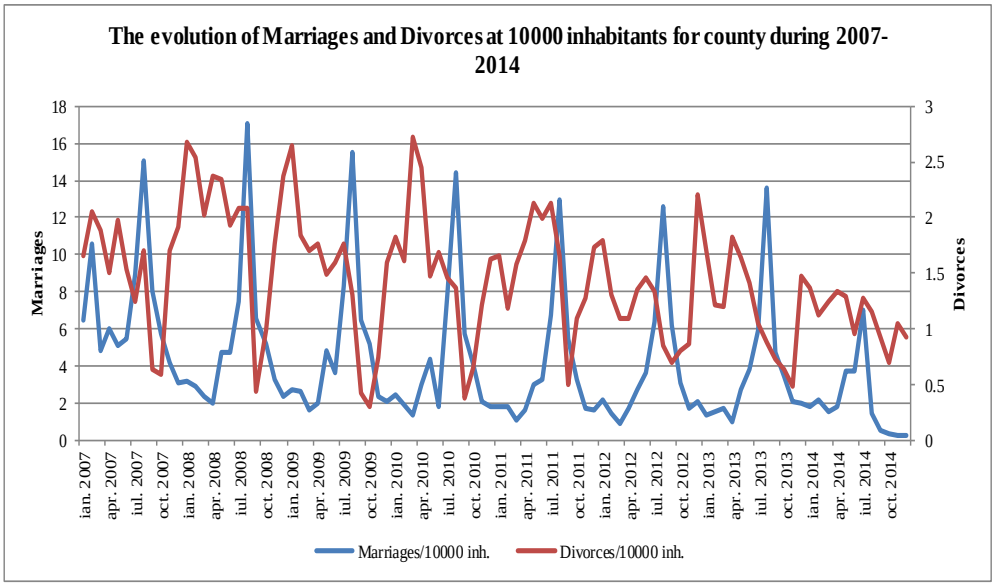


Figure 40

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.042417797x+6.330388158 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.008321961x+1.849552632 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 3 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (0.2,1.825,3.08,5.5175,17.07) and for "Divorces/10000 inh.": (0.3,1.08,1.47,1.7925,2.73). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (4,3.57) and for "Divorces/10000 inh.": (1,0.56). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [0,8] and for "Divorces/10000 inh." in [0,2].

Percentiles length indicators analysis (Figure 41) show that, indeed the concentration is around the middle of the data.

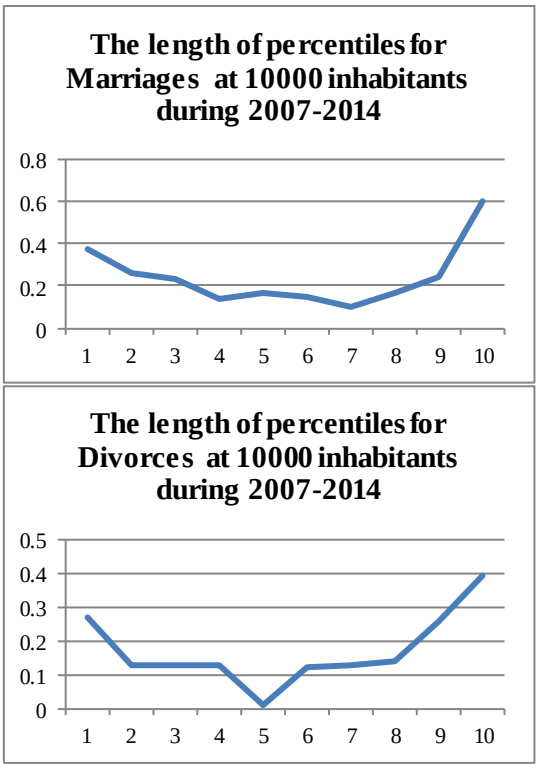


Figure 41

A comparison of the indicator "Marriages" with the national level shows that it is worse than the national, being better only in 25% cases. For "Divorces" the indicator is worse than the national, being better only in 29.17% cases.

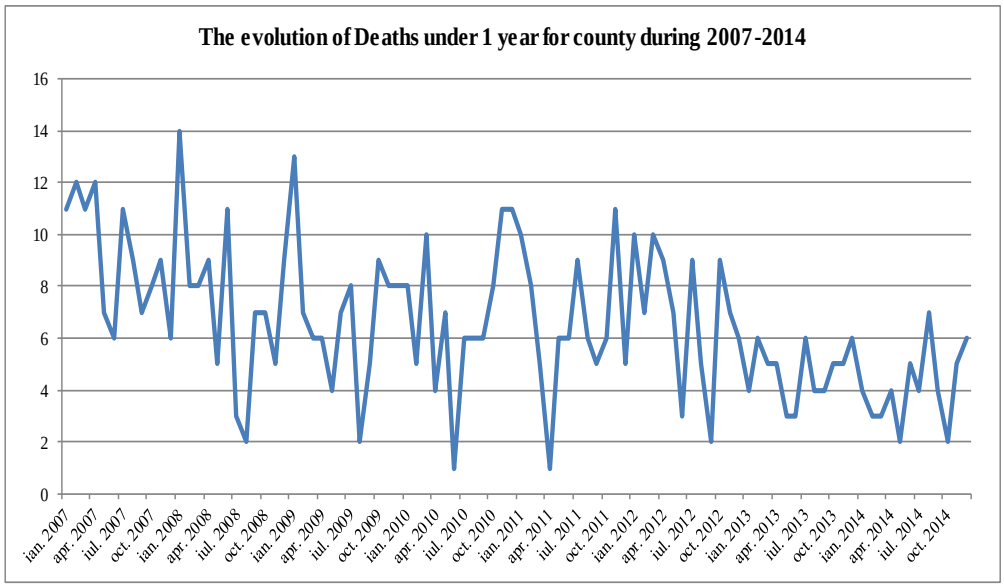


Figure 42

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.0487656x+8.927631579 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 6 and the distribution of quartiles is for "Deaths under 1 year": (1,5,6,8.25,14). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (7,2.81) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [4,10]. Percentiles length indicators analysis (Figure 43) show that, indeed the concentration is around the middle of the data.

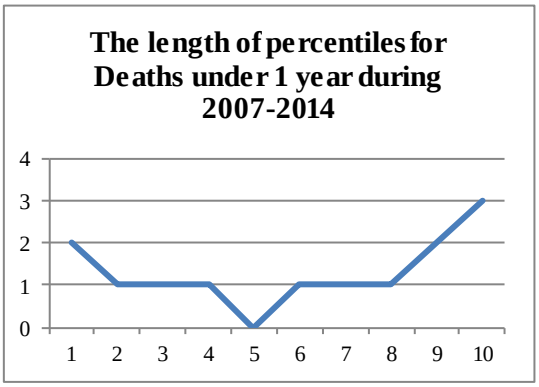


Figure 43

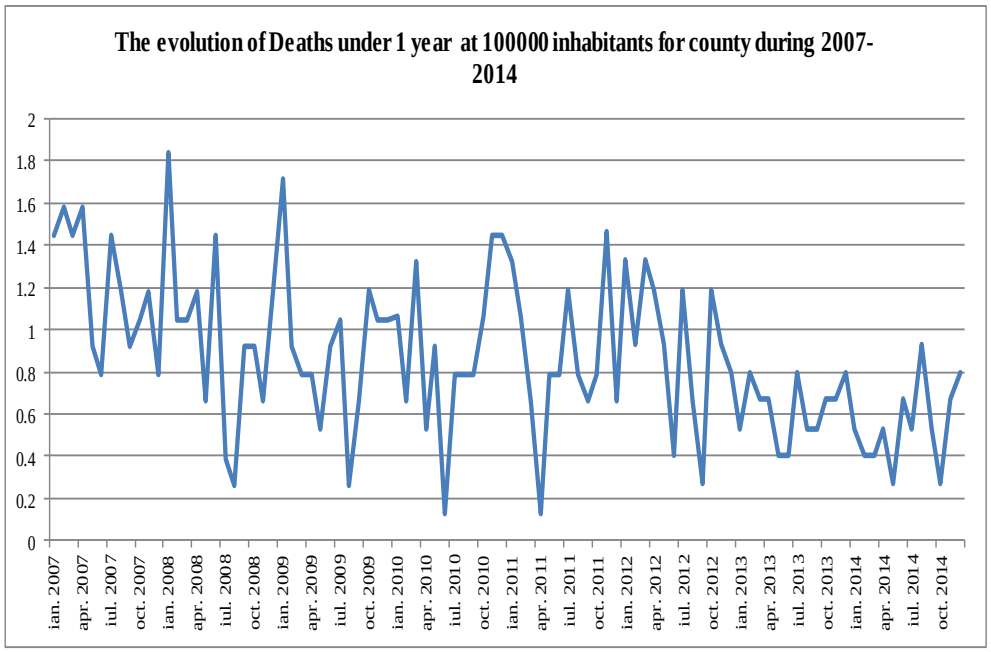


Figure 44

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.006294764x+1.172171053 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0.13,0.66,0.8,1.09,1.84). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.37) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is worse than the national, being better only in 36.46% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 24. The evolution of Bacau County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	9742	-
2008	10464	7.41
2009	9877	-5.61
2010	9541	-3.4
2011	8782	-7.96
2012	9018	2.69
2013	8612	-4.5
2014	8729	1.36

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is a dependence of Live births from GDP in the current year and the regression equation is: 0.3995dGDP+-1.8516. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is a dependence of Natural increase from GDP offset by 1 year and the regression equation is:13.3225dGDP+88.3678. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is not a dependence of the variation of GDP.

2.5. Analysis of Natural Movement of Bihor County Population

Statistics of natural movement corresponding to Bihor County are the following:

Table 25. The natural movement of Bihor County population during 2007-2008

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,07	561	783	-222	424	50	8	ian,08	577	687	-110	141	19	6
feb,07	496	586	-90	845	42	9	feb,08	537	659	-122	201	49	8
mar,07	503	678	-175	464	53	3	mar,08	481	674	-193	198	51	3
apr,07	471	637	-166	424	62	4	apr,08	550	623	-73	131	43	4
mai,07	514	641	-127	575	62	4	mai,08	477	662	-185	471	37	5
iun,07	512	601	-89	492	52	2	iun,08	518	567	-49	393	62	5
iul,07	588	649	-61	598	25	8	iul,08	646	573	73	470	54	6
aug,07	594	538	56	664	16	6	aug,08	536	535	1	756	22	6
sept,07	556	536	20	640	39	10	sept,08	621	556	65	547	33	10
oct,07	570	634	-64	445	33	9	oct,08	574	633	-59	471	35	5
nov,07	546	621	-75	326	43	6	nov,08	492	603	-111	228	44	2
dec,07	518	663	-145	175	35	9	dec,08	528	726	-198	126	38	7

Source: INSSE

Table 26. The natural movement of Bihor County population during 2009-2010

Source: INSSE

Table 27.The natural movement of Bihor County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	504	678	-174	81	11	6	ian,12	466	625	-159	90	16	6
feb,11	421	649	-228	121	100	5	feb,12	507	633	-126	105	82	6
mar,11	463	707	-244	116	85	11	mar,12	474	742	-268	131	75	2
apr,11	416	584	-168	117	102	4	apr,12	454	645	-191	166	72	5
mai,11	492	642	-150	370	106	5	mai,12	577	579	-2	300	67	8
iun,11	481	562	-81	295	112	2	iun,12	478	610	-132	320	77	2
iul,11	576	544	32	514	100	2	iul,12	584	644	-60	435	129	4
aug,11	554	564	-10	504	32	5	aug,12	565	565	0	536	37	3
sept,11	552	505	47	425	65	6	sept,12	510	556	-46	488	26	3
oct,11	536	587	-51	305	135	10	oct,12	571	580	-9	292	132	4
nov,11	506	576	-70	149	80	3	nov,12	507	600	-93	153	47	6
dec,11	425	615	-190	104	102	4	dec,12	477	602	-125	111	58	3

Source: INSSE

Table 28. The natural movement of Bihor County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	520	654	-134	80	26	8	ian,14	463	618	-155	104	15	4
feb,13	413	570	-157	111	93	7	feb,14	381	578	-197	132	59	4
mar,13	437	718	-281	154	96	4	mar,14	465	676	-211	112	78	3
apr,13	457	674	-217	94	94	8	apr,14	432	628	-196	134	78	1
mai,13	446	622	-176	282	26	10	mai,14	433	627	-194	407	42	2
iun,13	455	607	-152	407	71	4	iun,14	500	611	-111	283	59	3
iul,13	574	586	-12	406	32	4	iul,14	595	584	11	433	23	4
aug,13	520	539	-19	581	14	3	aug,14	531	521	10	570	93	1
sept,13	585	572	13	395	85	5	sept,14	551	561	-10	403	35	3
oct,13	524	586	-62	298	62	5	oct,14	515	602	-87	361	77	2
nov,13	463	590	-127	137	74	2	nov,14	438	576	-138	159	80	4
dec,13	463	693	-230	87	88	1	dec,14	479	633	-154	97	41	8

Source: INSSE

Table 29. The population trends of Bihor County during 2007-2014

Year	Population	Year	Population
2007	625647	2011	624695
2008	625611	2012	623756
2009	625286	2013	622971
2010	624809	2014	621805

Source: INSSE

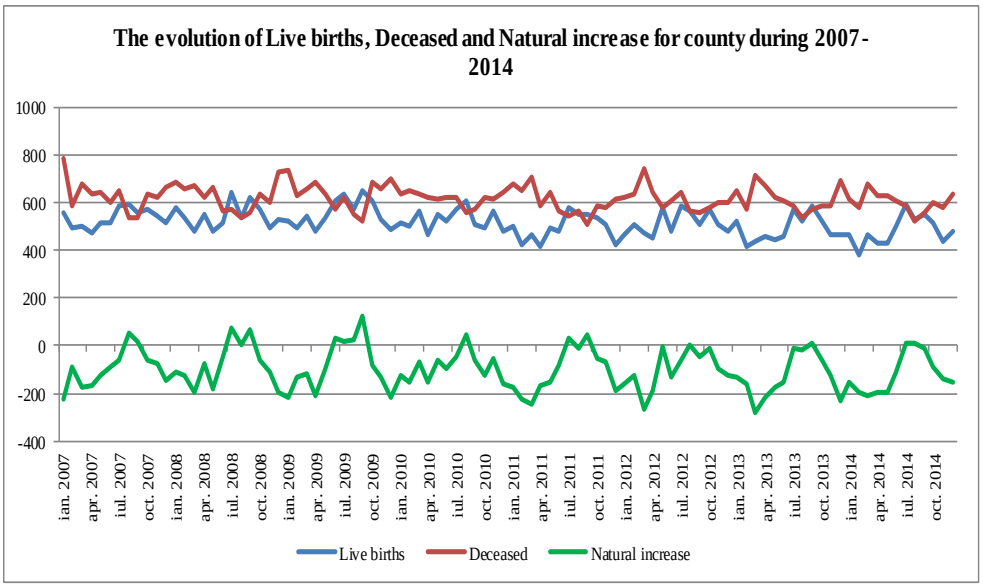


Figure 45

From figure 45 we can see a sinusoidal evolution of the indicator. Except months aug 2007, sept 2007, iul 2008, aug 2008, sept 2008, iun 2009, iul 2009, aug 2009, sept 2009, aug 2010, iul 2011, sept 2011, aug 2012, sept 2013, iul 2014, aug 2014 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-0.737798426x+553.710307 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=-0.401356484x+637.7782895 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Natural increase" gives us an equation: y=-0.336441942x+-84.06798246 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

For the set of values above, the median indicator for "Live births" is 515, for "Deceased" is 620 and for "Natural increase": -111. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (381,477.75,514.5,562,652), for "Deceased": (505,577.5,620,649,783) and for "Natural increase": (-281,-160.75,-111,-48.25,127).

The arithmetic mean and the standard deviation for “Live births” are: (518,55.87), for “Deceased”: (618,53.04) and for “Natural increase”: (-100,86.48). This means that with a probability greather than 0.68 “Live births” are in the range [462,574], for “Deceased” in [565,671] and for “Natural increase” in [-186,-14]. Percentiles length indicators analysis (Figure 46) show that, indeed the concentration is around the middle of the data.

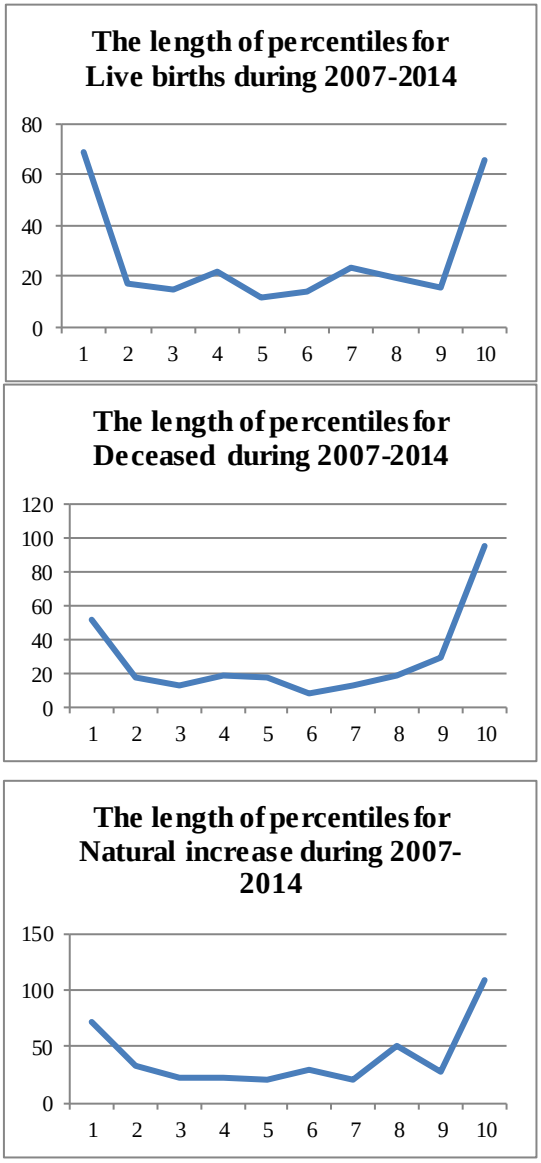


Figure 46

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 47.

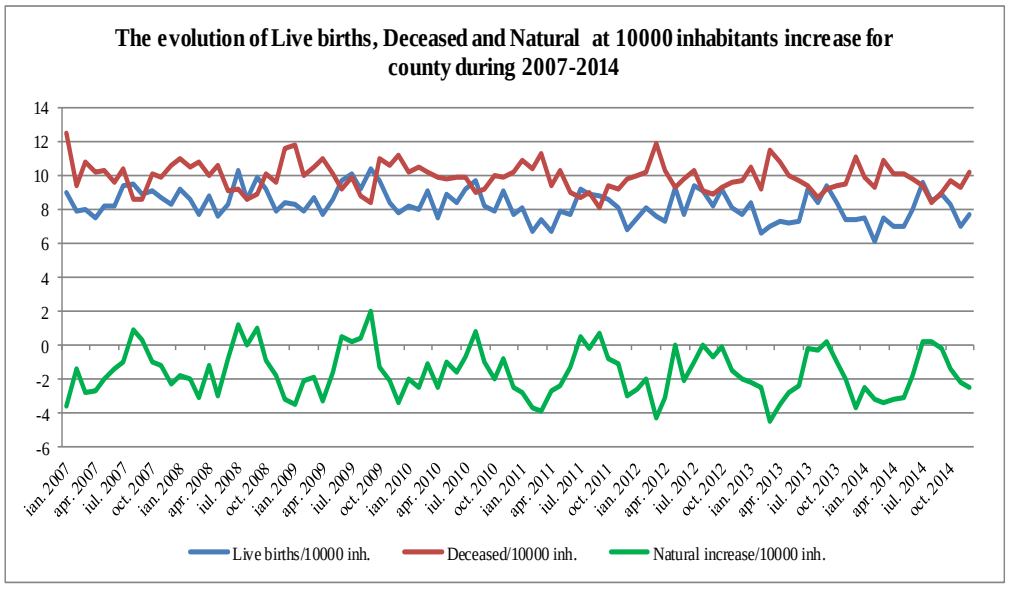


Figure 47

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.011253256x+8.840782895 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

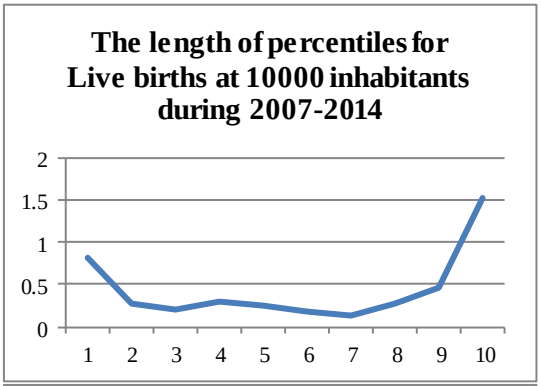
Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=-0.005752984x+10.18276974 where x is the number of month (Jan, 2007=1), therefore a very small downward trend. Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.005516278x+-1.34079386 where x is the number of month (Jan, 2007=1), therefore a very small downward trend. For the set of values above, the median indicator for "Live births/10000 inh." is 8, for "Deceased/10000 inh." is 10 and for "Natural increase/10000 inh.": -2. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

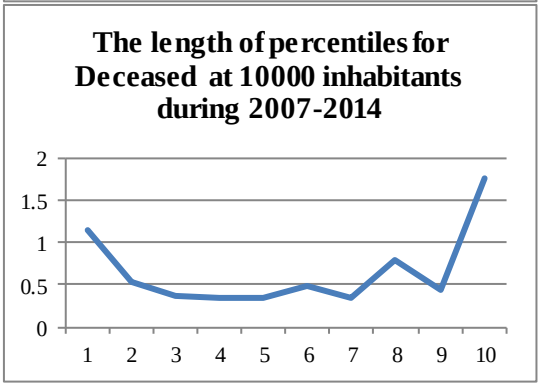
Also, the distribution of quartiles is for "Live births/10000 inh.": (6.13,7.6575,8.255,8.9925,10.43), for "Deceased/10000 inh.": (8.08,9.275,9.925,10.375,12.52) and for "Natural increase/10000 inh.": (-4.51,-2.575,-1.78,-0.77,2.03).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (8,0.89), for "Deceased/10000 inh.": (10,0.85) and for "Natural increase/10000

inh.": (-2,1.39). This means that with a probability greather than 0.68 "Live births/10000 inh." are in the range [7,9], for "Deceased/10000 inh." in [9,11] and for "Natural increase/10000 inh." in [-3,-1].

Percentiles length indicators analysis (Figure 48) show that, indeed the concentration is around the middle of the data.





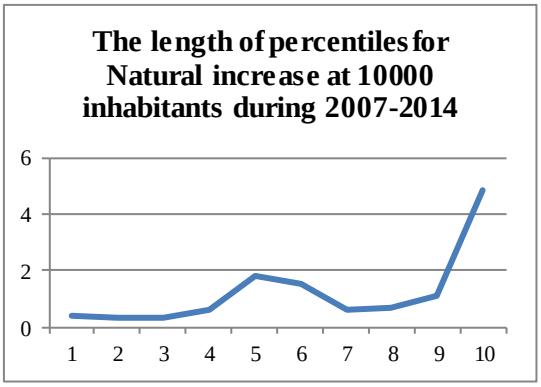


Figure 48

A comparison of the indicator "Live births" with the national level shows that it is better than the national, being better in 89.58% cases. For "Deceased" the indicator is worse than the national, being better only in 17.71% cases. Finally, for "Natural increase", the indicator is about the same with the national, being better in 56.25% cases.

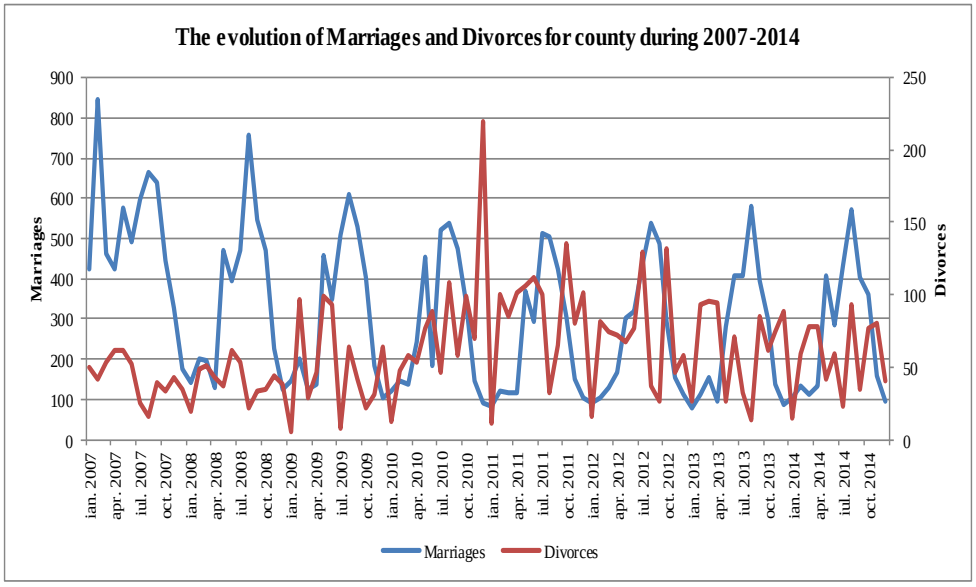


Figure 49

Regression analysis relative to indicator "Marriages" gives us an equation: y=-2.120082746x+413.3969298 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=0.291481281x+46.59232456 where x is the number of month (Jan, 2007=1), therefore an upward trend.

For the set of values above, the median indicator for "Marriages" is 297 and for "Divorces" is 58. Also, the distribution of quartiles is for "Marriages": (80,136.25,296.5,460.25,845) and for "Divorces": (6,35,58,80.5,220). The arithmetic mean and the standard deviation for "Marriages" are: (311,184.12) and for "Divorces": (61,34.25). This means that with a probability greather than 0.68 "Marriages" are in the range [127,495] and for "Divorces" in [27,95].

Percentiles length indicators analysis (Figure 50) show that, indeed the concentration is around the middle of the data.

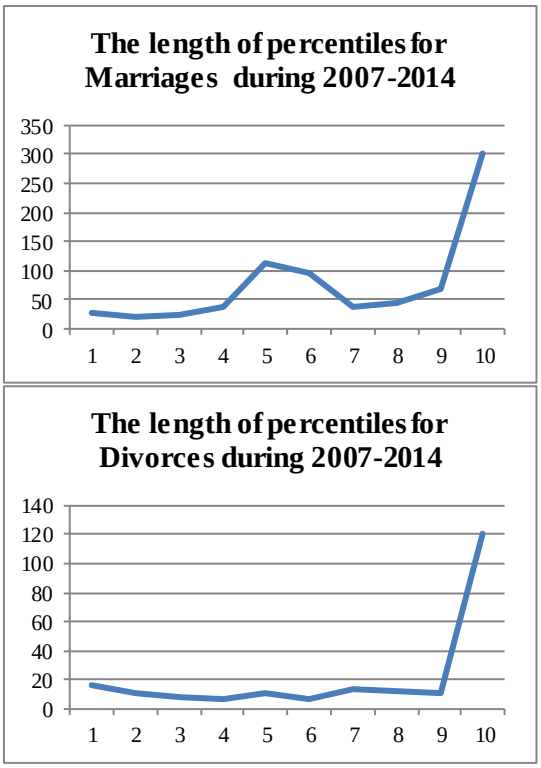


Figure 50

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 51.

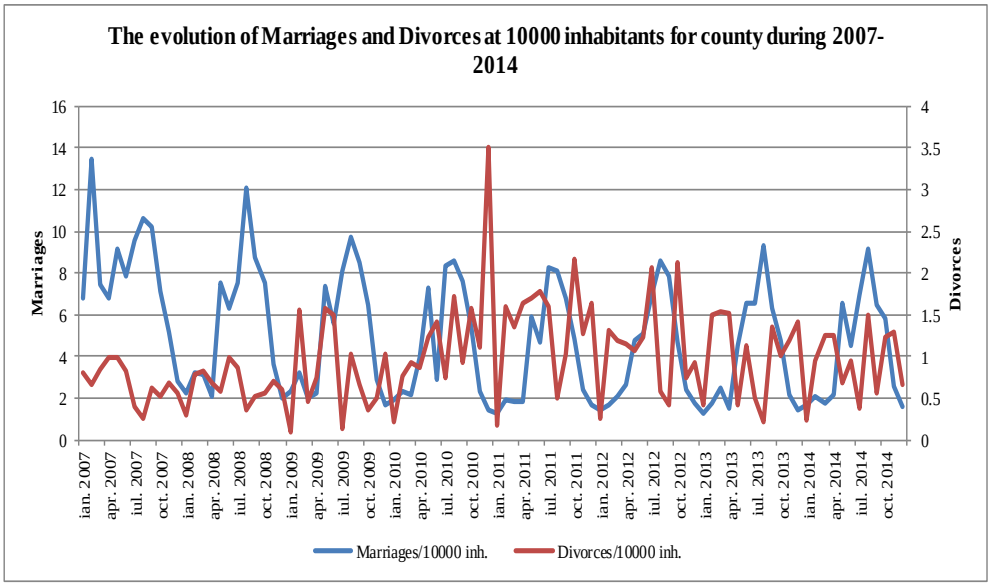


Figure 51

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.033580507x+6.601258772 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=0.004723277x+0.743421053 where x is the number of month (Jan, 2007=1), therefore an upward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 5 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (1.28,2.1825,4.75,7.36,13.51) and for "Divorces/10000 inh.": (0.1,0.56,0.93,1.295,3.52). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (5,2.95) and for "Divorces/10000 inh.": (1,0.55). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [2,8] and for "Divorces/10000 inh." in [0,2].

Percentiles length indicators analysis (Figure 52) show that, indeed the concentration is around the middle of the data.

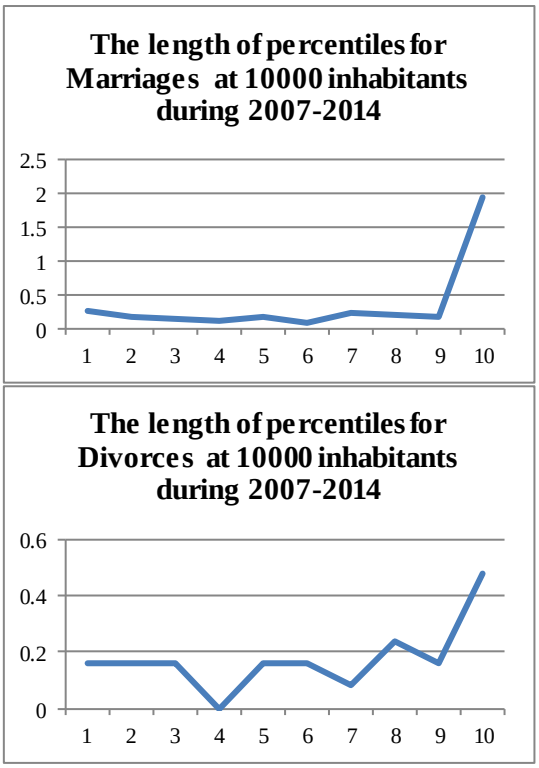


Figure 52

A comparison of the indicator "Marriages" with the national level shows that it is about the same with the national, being better in 56.25% cases. For "Divorces" the indicator is better than the national, being better in 61.46% cases.

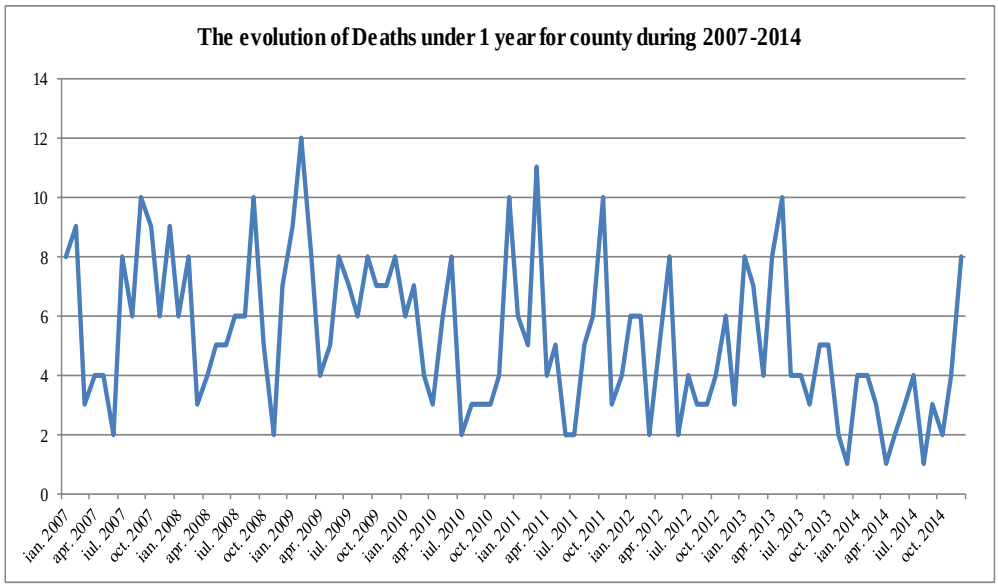


Figure 53

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.034441129x+6.962061404 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 5 and the distribution of quartiles is for "Deaths under 1 year": (1,3,5,7,12). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (5,2.55) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [2,8]. Percentiles length indicators analysis (Figure 54) show that, indeed the concentration is around the middle of the data.

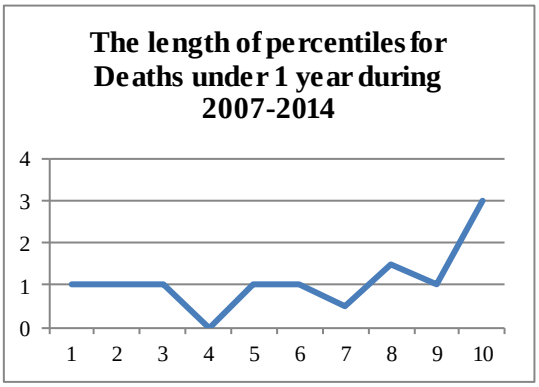


Figure 54

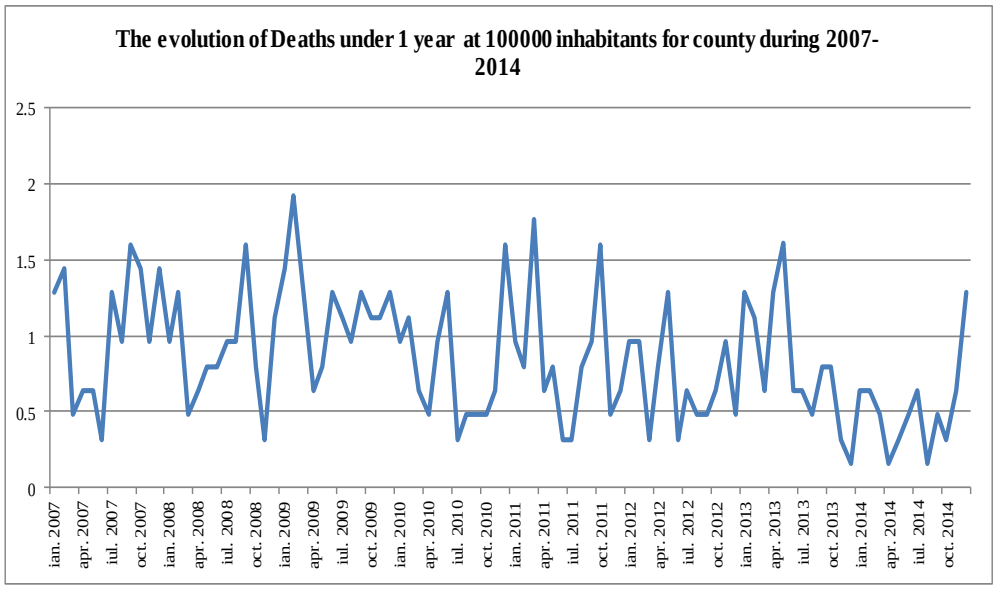


Figure 55

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.005500271x+1.113638158 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0.16,0.48,0.8,1.12,1.92). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.41) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is about the same with the national, being better in 44.79% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 30. The evolution of Bihor County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	11693	-
2008	11645	-0.41
2009	10596	-9.01
2010	10539	-0.53

2011	9618	-8.74
2012	9406	-2.2
2013	9662	2.72
2014	10397	7.61

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is a dependence of Live births from GDP offset by 2 years and the regression equation is:0.6841dGDP+0.1541. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is a dependence of Deaths under 1 year from GDP offset by 2 years and the regression equation is:-4.9457dGDP+-33.2932.

2.6. Analysis of Natural Movement of Bistrita-Nasaud County Population

Statistics of natural movement corresponding to Bistrita-Nasaud County are the following:

Table 31. The natural movement of Bistrita-Nasaud County population during 2007-2008

ian,07	267	348	-81	178	56	4	ian,08	322	301	21	112	8	5
feb,07	234	247	-13	206	45	3	feb,08	284	294	-10	125	24	1
mar,07	291	290	1	79	47	2	mar,08	286	268	18	98	31	5
apr,07	266	259	7	187	40	3	apr,08	305	299	6	56	21	1
mai,07	279	272	7	228	54	2	mai,08	275	279	-4	227	21	6
iun,07	286	252	34	189	45	4	iun,08	277	279	-2	182	41	4

iul,07	306	240	66	352	15	2	iul,08	319	247	72	300	15	3
aug,07	299	242	57	367	23	2	aug,08	298	232	66	416	46	6
sept,07	289	245	44	322	47	0	sept,08	331	252	79	280	8	3
oct,07	327	292	35	199	50	5	oct,08	339	270	69	198	13	3
nov,07	250	285	-35	147	57	3	nov,08	303	263	40	115	13	2
dec,07	275	276	-1	53	45	7	dec,08	293	301	-8	49	56	3

Source: INSSE

Table 32. The natural movement of Bistrita-Nasaud County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	273	311	-38	83	16	5	ian,10	237	282	-45	102	17	3
feb,09	300	265	35	110	48	2	feb,10	262	271	-9	89	12	3
mar,09	275	332	-57	39	58	4	mar,10	310	281	29	43	76	3
apr,09	288	273	15	55	22	5	apr,10	279	285	-6	128	146	2
mai,09	271	290	-19	233	37	4	mai,10	294	295	-1	198	63	2
iun,09	311	236	75	137	13	0	iun,10	312	263	49	77	5	1
iul,09	384	237	147	358	8	3	iul,10	328	294	34	331	16	6
aug,09	342	253	89	392	30	1	aug,10	347	240	107	296	13	1
sept,09	319	245	74	253	10	5	sept,10	299	243	56	237	8	1
oct,09	331	290	41	200	50	2	oct,10	306	300	6	159	31	3
nov,09	261	270	-9	97	64	4	nov,10	277	271	6	82	12	4
dec,09	262	302	-40	30	14	2	dec,10	278	311	-33	55	15	2

Source: INSSE

Table 33. The natural movement of Bistrita-Nasaud County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	253	307	-54	83	14	2	ian,12	274	281	-7	86	14	1
feb,11	271	280	-9	92	80	3	feb,12	251	281	-30	72	37	1
mar,11	270	295	-25	54	14	0	mar,12	246	342	-96	38	22	1
apr,11	225	258	-33	56	5	3	apr,12	221	332	-111	88	38	3
mai,11	287	306	-19	207	41	2	mai,12	314	303	11	180	5	2
iun,11	273	253	20	112	21	3	iun,12	234	278	-44	151	41	1
iul,11	266	240	26	328	15	1	iul,12	310	278	32	285	15	0
aug,11	339	244	95	321	31	2	aug,12	366	273	93	325	1	1
sept,11	278	214	64	213	18	0	sept,12	295	258	37	297	16	2
oct,11	287	291	-4	164	27	3	oct,12	271	283	-12	180	18	3
nov,11	271	288	-17	89	78	2	nov,12	299	262	37	73	5	2
dec,11	239	296	-57	48	7	3	dec,12	202	270	-68	69	33	4

Source: INSSE

Table 34. The natural movement of Bistrita-Nasaud County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	314	299	15	78	15	1	ian,14	289	293	-4	82	0	1
feb,13	241	236	5	65	21	3	feb,14	243	257	-14	73	13	0
mar,13	228	256	-28	102	32	3	mar,14	247	303	-56	47	22	4
apr,13	248	297	-49	44	2	5	apr,14	259	297	-38	54	5	2
mai,13	258	245	13	176	25	1	mai,14	245	304	-59	226	23	3
iun,13	259	252	7	189	33	2	iun,14	284	244	40	139	32	1
iul,13	337	266	71	238	6	2	iul,14	343	242	101	308	15	1
aug,13	354	245	109	342	20	5	aug,14	318	223	95	361	2	2
sept,13	352	258	94	217	22	2	sept,14	300	269	31	201	22	2
oct,13	293	269	24	181	3	2	oct,14	273	246	27	201	20	2
nov,13	238	266	-28	101	31	2	nov,14	230	276	-46	84	12	1
dec,13	267	294	-27	35	52	2	dec,14	262	312	-50	47	28	2

Source: INSSE

Table 35. The population trends of Bistrita-Nasaud County during 2007-2014

Year	Population	Year	Population
2007	330883	2011	331241
2008	330903	2012	330819
2009	331145	2013	330246
2010	331414	2014	329934

Source: INSSE

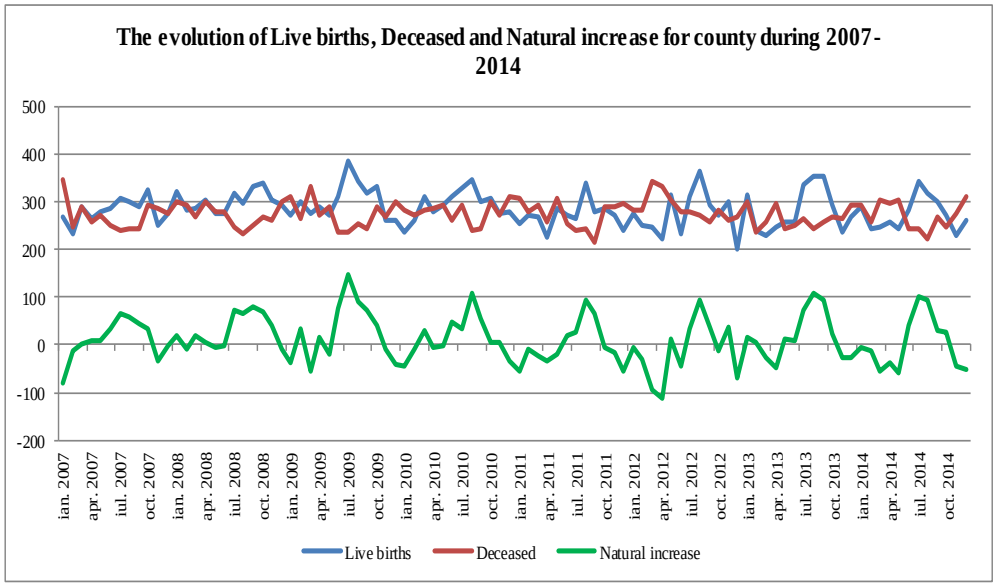


Figure 56

From figure 56 we can see a sinusoidal evolution of the indicator. Except months mar 2007, apr 2007, mai 2007, iun 2007, iul 2007, aug 2007, sept 2007, oct 2007, ian 2008, mar 2008, apr 2008, iul 2008, aug 2008, sept 2008, oct 2008, nov 2008, feb 2009, apr 2009, iun 2009, iul 2009, aug 2009, sept 2009, oct 2009, mar 2010, iun 2010, iul 2010, aug 2010, sept 2010, oct 2010, nov 2010, iun 2011, iul 2011, aug 2011, sept 2011, mai 2012, iul 2012, aug 2012, sept 2012, nov 2012, ian 2013, feb 2013, mai 2013, iun 2013, iul 2013, aug 2013, sept 2013, oct 2013, iun 2014, iul 2014, aug 2014, sept 2014, oct 2014 the natural increase was negative.

Regression analysis relative to indicator “Live births” gives us an equation: y=-0.217356213x+295.6563596 where x is the number of month (Jan, 2007=1), therefore a downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=-0.028180955x+275.689693 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Natural increase" gives us an equation: y=-0.189175258x+19.96666667 where x is the number of month (Jan, 2007=1), therefore a downward trend.

For the set of values above, the median indicator for "Live births" is 282, for "Deceased" is 273 and for "Natural increase": 6. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (202,262,281.5,307,384), for "Deceased": (214,252.75,273,294,348) and for "Natural increase": (-111,-25.5,6,40,147).

The arithmetic mean and the standard deviation for "Live births" are: (285,35.1), for "Deceased": (274,26.4) and for "Natural increase": (11,49.6). This means that with a probability greather than 0.68 "Live births" are in the range [250,320], for "Deceased" in [248,300] and for "Natural increase" in [-39,61].

Percentiles length indicators analysis (Figure 57) show that, indeed the concentration is around the middle of the data.

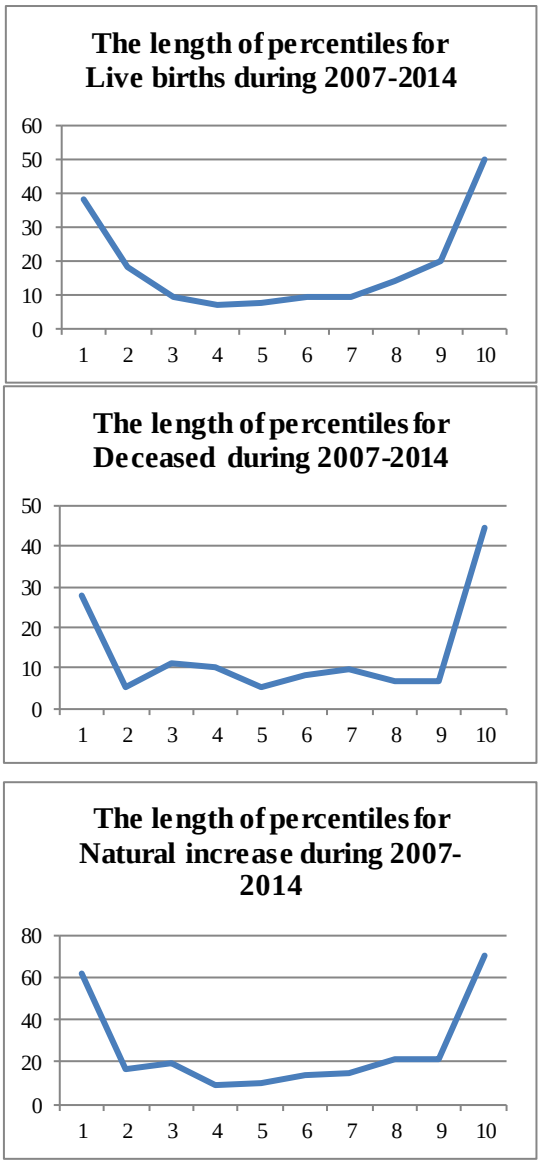


Figure 57

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 58.

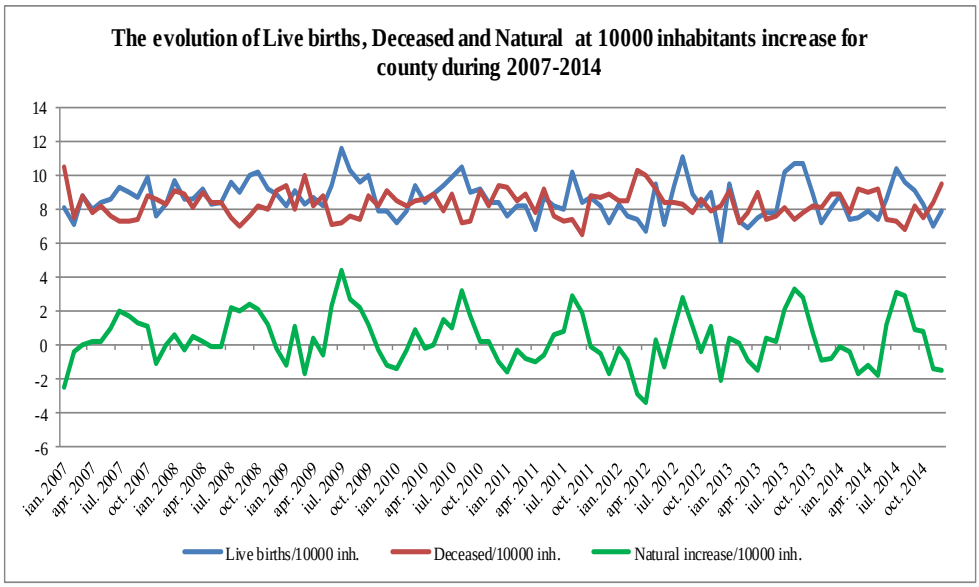


Figure 58

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.006279436x+8.922260965 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=-0.000581525x+8.320078947 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.005708356x+0.60289693 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 9, for "Deceased/10000 inh." is 8 and for "Natural increase/10000 inh.": 0. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (6.11,7.91,8.505,9.275,11.6), for "Deceased/10000 inh.": (6.46,7.6375,8.245,8.885,10.52) and for "Natural increase/10000 inh.": (-3.36,-0.7675,0.18,1.21,4.44).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (9,1.06), for "Deceased/10000 inh.": (8,0.8) and for "Natural increase/10000 inh.": (0,1.5). This means that with a probability greather than 0.68 "Live births/10000

inh." are in the range [8,10], for "Deceased/10000 inh." in [7,9] and for "Natural increase/10000 inh." in [-2,2].

Percentiles length indicators analysis (Figure 59) show that, indeed the concentration is around the middle of the data.

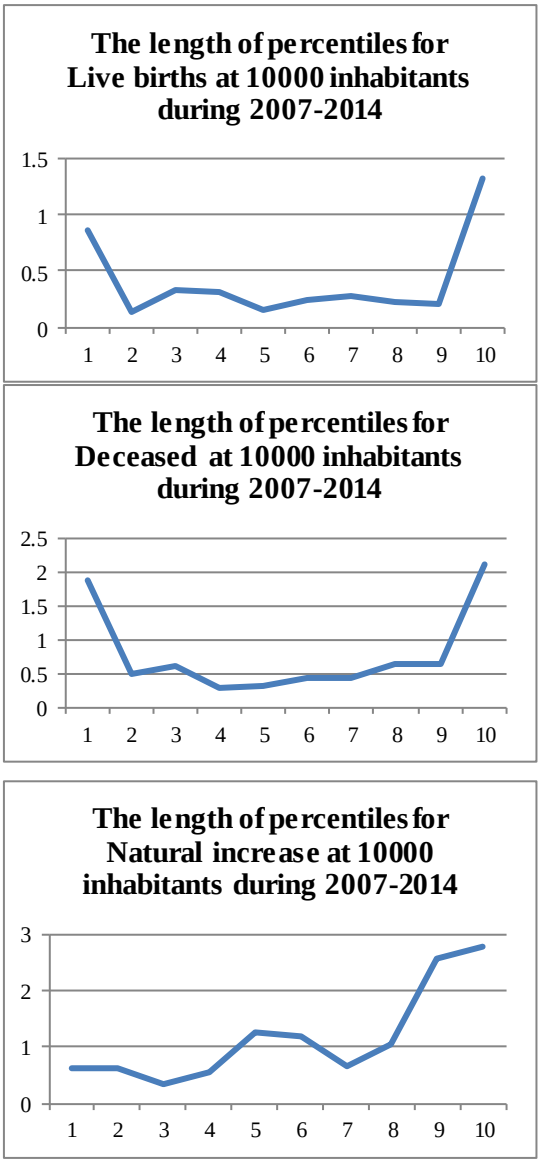


Figure 59

A comparison of the indicator "Live births" with the national level shows that it is better than the national, being better in 93.75% cases. For "Deceased" the indicator is better than the national, being better in 96.88% cases. Finally, for "Natural increase", the indicator is better than the national, being better in 100% cases.

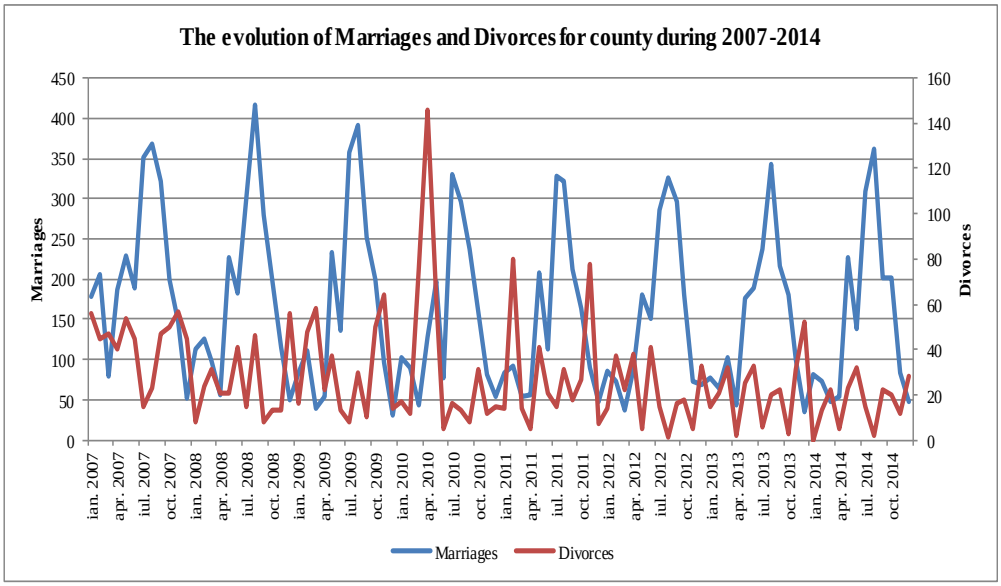


Figure 60

Regression analysis relative to indicator "Marriages" gives us an equation: y=-0.494879273x+187.0328947 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.241745795x+39.40175439 where x is the number of month (Jan, 2007=1), therefore a downward trend.

For the set of values above, the median indicator for "Marriages" is 143 and for "Divorces" is 22. Also, the distribution of quartiles is for "Marriages": (30,78.75,143,226.25,416) and for "Divorces": (0,13,21.5,40.25,146). The arithmetic mean and the standard deviation for "Marriages" are: (163,101.24) and for "Divorces": (28,22.13). This means that with a probability greather than 0.68 "Marriages" are in the range [62,264] and for "Divorces" in [6,50].

Percentiles length indicators analysis (Figure 61) show that, indeed the concentration is around the middle of the data.

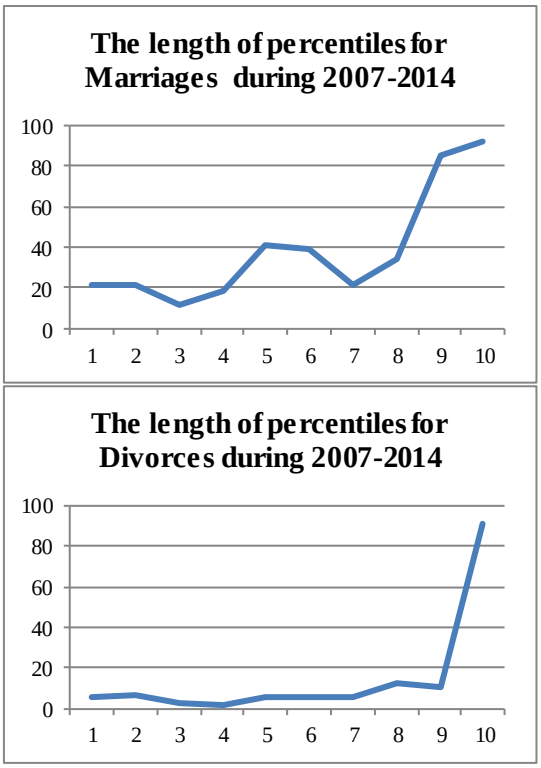


Figure 61

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 62.

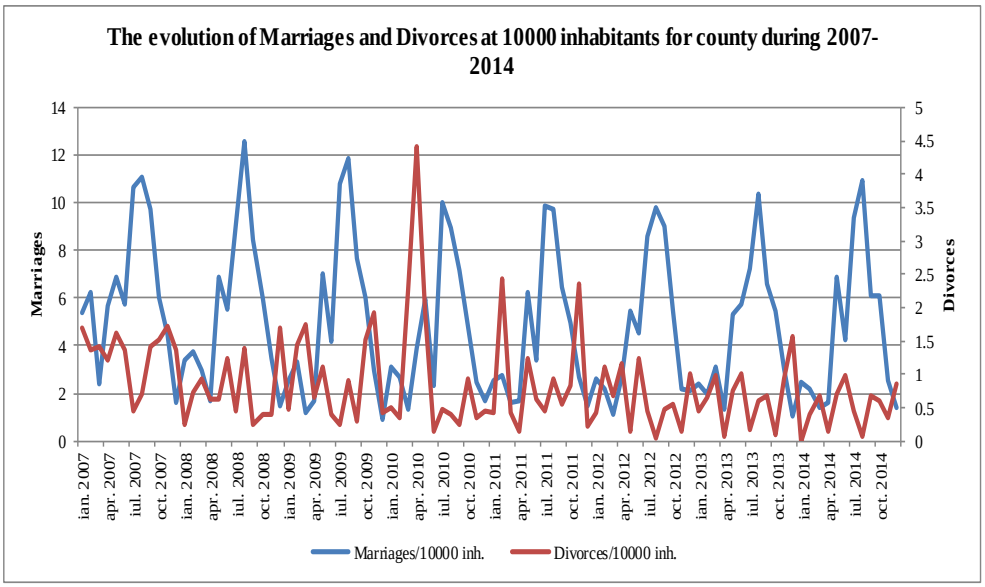


Figure 62

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.014803785x+5.646004386 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.007272111x+1.188530702 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 4 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (0.91,2.3825,4.325,6.8525,12.57) and for "Divorces/10000 inh.": (0,0.39,0.65,1.2175,4.41). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (5,3.06) and for "Divorces/10000 inh.": (1,0.67). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [2,8] and for "Divorces/10000 inh." in [0,2].

Percentiles length indicators analysis (Figure 63) show that, indeed the concentration is around the middle of the data.

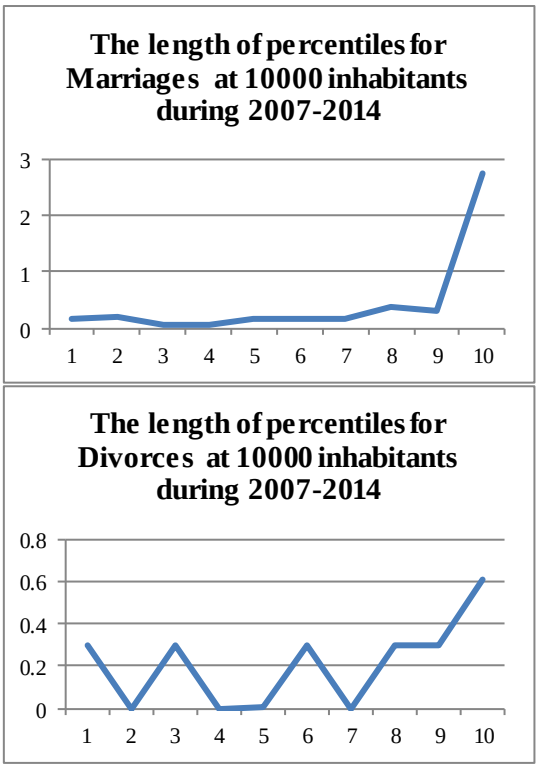


Figure 63

A comparison of the indicator "Marriages" with the national level shows that it is about the same with the national, being better in 54.17% cases. For "Divorces" the indicator is better than the national, being better in 76.04% cases.

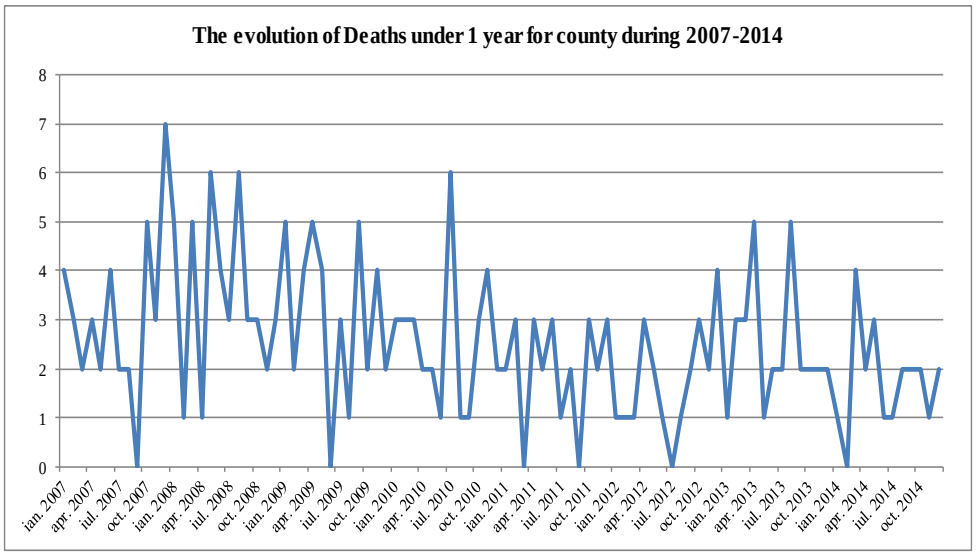


Figure 64

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.018292187x+3.418421053 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 2 and the distribution of quartiles is for "Deaths under 1 year": (0,1.75,2,3,7). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (3,1.51) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [1,5].

Percentiles length indicators analysis (Figure 65) show that, indeed the concentration is around the middle of the data.

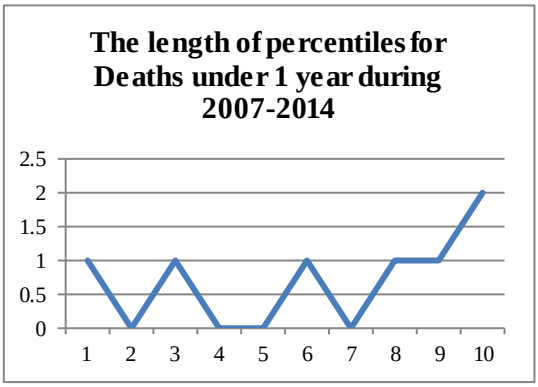


Figure 65

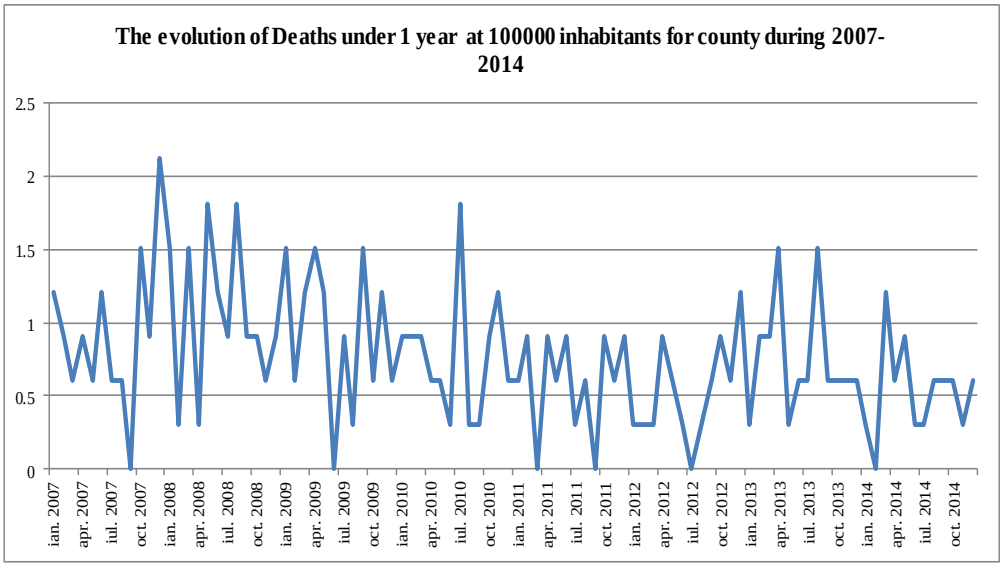


Figure 66

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.005497355x+1.031725877 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0,0.525,0.61,0.91,2.12). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.46) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is about the same with the national, being better in 52.08% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 36. The evolution of Bistrita-Nasaud County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	4891	-
2008	5189	6.08
2009	5063	-2.42
2010	4482	-11.47
2011	4456	-0.58

2012	4707	5.62
2013	4516	-4.06
2014	4610	2.08

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is a dependence of Live births from GDP offset by 1 year and the regression equation is:0.5102dGDP+-0.9775. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is a dependence of Divorces from GDP in the current year and the regression equation is: -3.3528dGDP+-12.458. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is not a dependence of the variation of GDP.

2.7. Analysis of Natural Movement of Botosani County Population

Statistics of natural movement corresponding to Botosani County are the following:

Table 37. The natural movement of Botosani County population during 2007-2008

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,07	353	674	-321	217	96	11	ian,08	514	539	-25	99	35	9
feb,07	348	461	-113	190	64	5	feb,08	391	443	-52	118	9	3
mar,07	419	483	-64	124	57	10	mar,08	428	481	-53	121	61	5
apr,07	363	434	-71	264	69	7	apr,08	364	501	-137	111	59	5
mai,07	396	468	-72	243	60	7	mai,08	404	448	-44	252	64	9
iun,07	377	430	-53	205	93	12	iun,08	434	446	-12	197	4	5
iul,07	437	416	21	405	38	5	iul,08	423	380	43	349	104	3
aug,07	412	422	-10	598	24	8	aug,08	501	430	71	653	93	3

sept,07	449	394	55	441	46	5	sept,08	478	421	57	332	130	3
oct,07	397	461	-64	233	63	10	oct,08	469	480	-11	250	55	2
nov,07	386	475	-89	161	99	3	nov,08	346	493	-147	131	33	8
dec,07	365	563	-198	170	46	6	dec,08	370	572	-202	161	5	3

Source: INSSE

Table 38. The natural movement of Botosani County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	461	534	-73	109	40	4	ian,10	389	558	-169	101	13	2
feb,09	369	481	-112	112	49	6	feb,10	328	535	-207	69	21	4
mar,09	374	560	-186	49	76	8	mar,10	361	538	-177	46	68	7
apr,09	392	512	-120	98	129	8	apr,10	339	495	-156	118	169	6
mai,09	459	457	2	207	40	3	mai,10	354	465	-111	199	52	4
iun,09	347	436	-89	144	61	4	iun,10	368	473	-105	80	129	5
iul,09	484	426	58	356	81	2	iul,10	436	432	4	320	35	7
aug,09	476	387	89	625	135	3	aug,10	465	435	30	506	120	6
sept,09	465	438	27	288	43	5	sept,10	408	403	5	323	65	6
oct,09	364	523	-159	219	10	9	oct,10	337	493	-156	162	16	3
nov,09	423	503	-80	122	9	4	nov,10	336	475	-139	70	31	4
dec,09	335	604	-269	127	27	4	dec,10	278	542	-264	124	43	4

Source: INSSE

Table 39. The natural movement of Botosani County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	373	510	-137	91	38	7	ian,12	345	569	-224	83	26	3
feb,11	267	473	-206	76	54	8	feb,12	316	575	-259	67	75	3
mar,11	317	526	-209	48	56	5	mar,12	315	484	-169	52	47	3
apr,11	279	511	-232	90	113	7	apr,12	318	487	-169	98	20	6
mai,11	305	447	-142	149	45	4	mai,12	396	426	-30	130	29	7
iun,11	355	389	-34	134	73	1	iun,12	342	408	-66	148	32	6
iul,11	348	391	-43	292	51	3	iul,12	450	445	5	317	51	1
aug,11	499	406	93	491	42	1	aug,12	528	387	141	475	70	4
sept,11	391	384	7	265	53	3	sept,12	389	413	-24	310	23	4
oct,11	331	479	-148	148	31	4	oct,12	369	506	-137	135	19	9
nov,11	303	514	-211	97	71	6	nov,12	379	423	-44	95	19	5
dec,11	335	524	-189	103	18	5	dec,12	252	571	-319	94	34	5

Source: INSSE

Table 40. The natural movement of Botosani County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	404	552	-148	67	7	5	ian,14	345	503	-158	78	10	3
feb,13	270	476	-206	56	63	1	feb,14	300	488	-188	78	95	4
mar,13	285	511	-226	72	54	10	mar,14	328	545	-217	57	46	7
apr,13	313	477	-164	44	16	4	apr,14	299	496	-197	90	205	3
mai,13	326	440	-114	149	54	6	mai,14	357	475	-118	163	30	7
iun,13	320	390	-70	149	19	6	iun,14	355	412	-57	130	30	3
iul,13	431	399	32	257	73	2	iul,14	396	465	-69	291	21	4

aug,13	440	430	10	495	48	5	aug,14	457	447	10	558	50	6
sept,13	381	414	-33	257	27	4	sept,14	401	358	43	243	81	3
oct,13	356	480	-124	165	38	6	oct,14	354	529	-175	174	17	5
nov,13	338	443	-105	108	37	4	nov,14	307	469	-162	95	23	5
dec,13	258	541	-283	88	27	3	dec,14	283	610	-327	125	10	5

Source: INSSE

Table 41. The population trends of Botosani County during 2007-2014

Year	Population	Year	Population
2007	477623	2011	468103
2008	475347	2012	465899
2009	473358	2013	463994
2010	471089	2014	461749

Source: INSSE

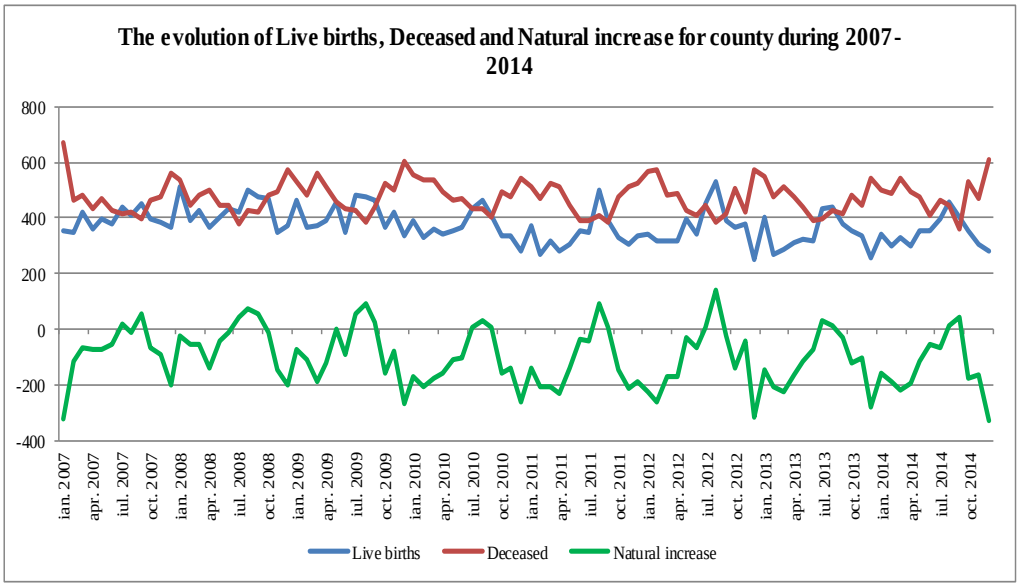


Figure 67

From figure 67 we can see a sinusoidal evolution of the indicator. Except months iul 2007, sept 2007, iul 2008, aug 2008, sept 2008, mai 2009, iul 2009, aug 2009, sept 2009, iul 2010, aug 2010, sept 2010, aug 2011, sept 2011, iul 2012, aug 2012, iul 2013, aug 2013, aug 2014, sept 2014 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-0.850406945x+416.0155702 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=-0.070727075x+478.6177632 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Natural increase" gives us an equation: y=-0.77967987x+-62.60219298 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

For the set of values above, the median indicator for "Live births" is 367, for "Deceased" is 475 and for "Natural increase": -108. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (252,335,366.5,413.75,528), for "Deceased": (358,430,475,511.25,674) and for "Natural increase": (-327,-170.5,-108,-24.75,141).

The arithmetic mean and the standard deviation for "Live births" are: (375,61.27), for "Deceased": (475,59.2) and for "Natural increase": (-100,101.71). This means that with a probability greather than 0.68 "Live births" are in the range [314,436], for "Deceased" in [416,534] and for "Natural increase" in [-202,2].

Percentiles length indicators analysis (Figure 68) show that, indeed the concentration is around the middle of the data.

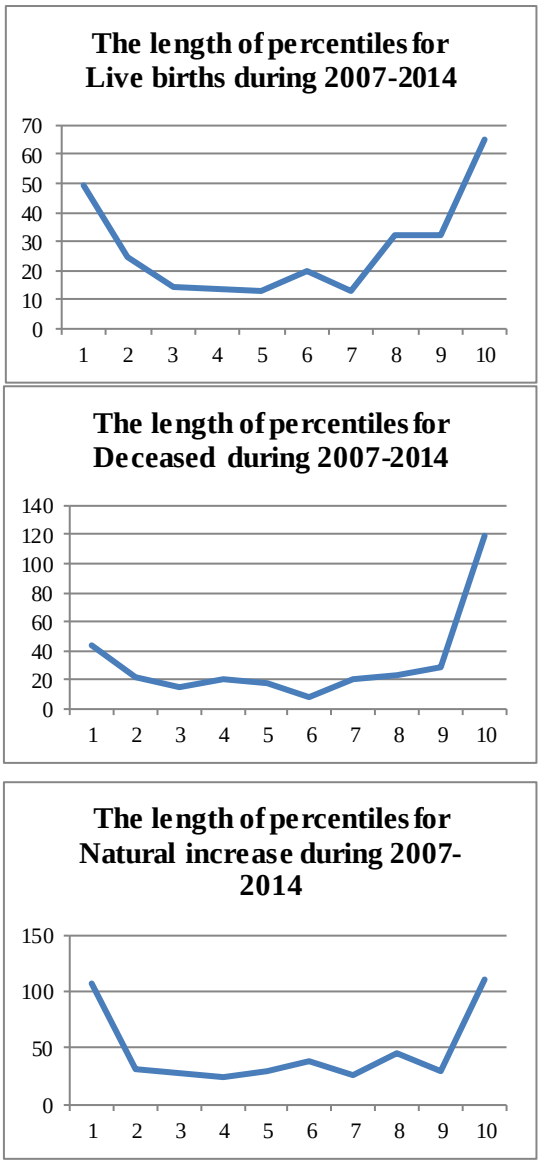


Figure 68

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 69.

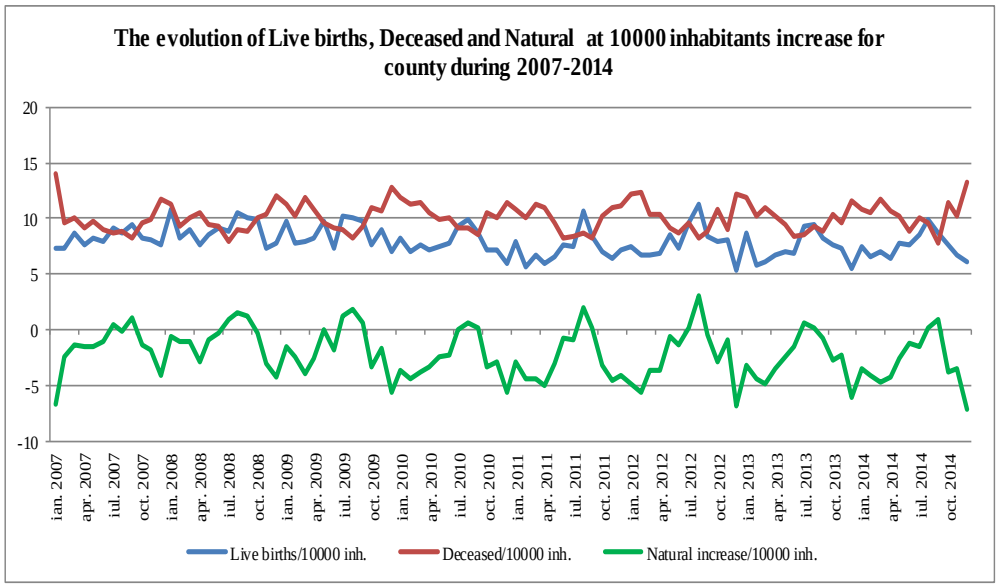


Figure 69

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.014880155x+8.696791667 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=0.002554327x+9.994969298 where x is the number of month (Jan, 2007=1), therefore a very small upward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.017428106x+-1.298695175 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 8, for "Deceased/10000 inh." is 10 and for "Natural increase/10000 inh.": -2. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (5.41,7.1225,7.755,8.725,11.33), for "Deceased/10000 inh.": (7.75,9.1275,10.1,10.935,14.11) and for "Natural increase/10000 inh.": (-7.08,-3.6625,-2.31,-0.5275,3.03).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (8,1.27), for "Deceased/10000 inh.": (10,1.26) and for "Natural increase/10000 inh.": (-2,2.17). This means that with a probability greather than 0.68 "Live

births/10000 inh." are in the range [7,9], for "Deceased/10000 inh." in [9,11] and for "Natural increase/10000 inh." in [-4,0].

Percentiles length indicators analysis (Figure 70) show that, indeed the concentration is around the middle of the data.

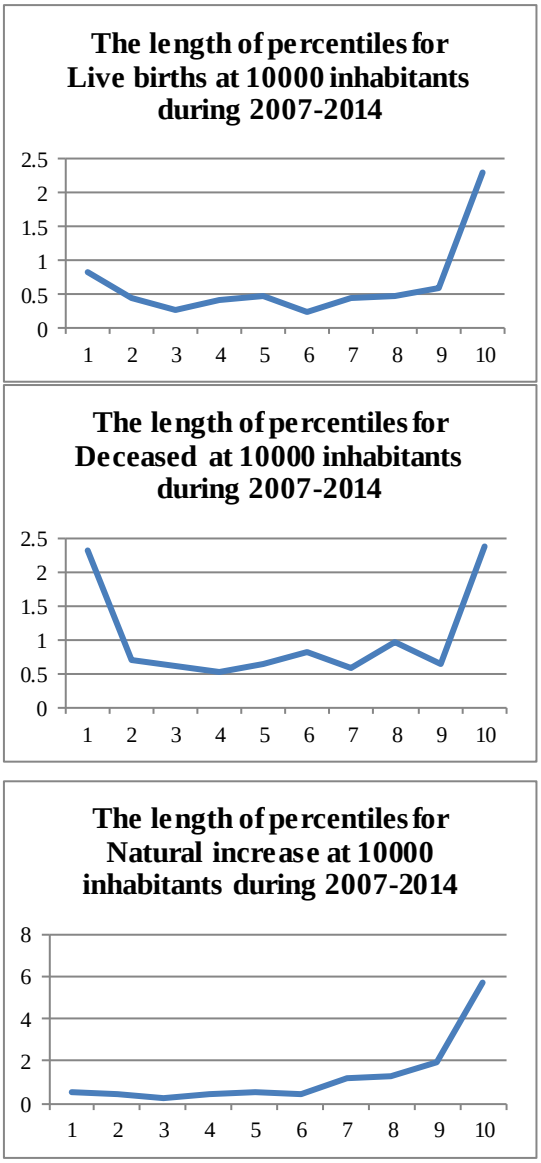


Figure 70

A comparison of the indicator "Live births" with the national level shows that it is better than the national, being better in 67.71% cases. For "Deceased" the indicator is worse than the national, being better only in 10.42% cases. Finally, for "Natural increase", the indicator is worse than the national, being better only in 37.5% cases.

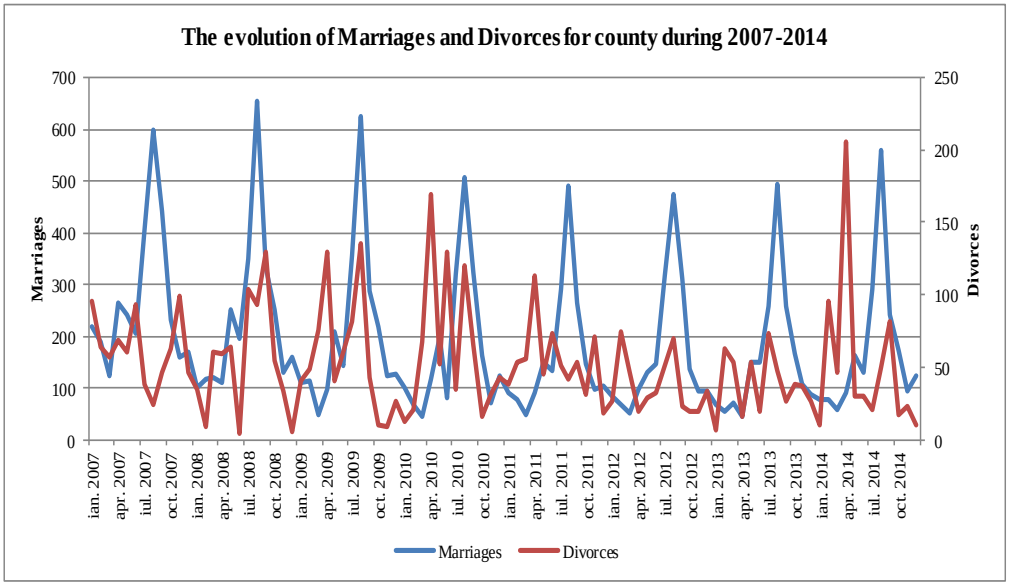


Figure 71

Regression analysis relative to indicator "Marriages" gives us an equation: y=-0.957582746x+239.9427632 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.253960933x+64.81710526 where x is the number of month (Jan, 2007=1), therefore a downward trend.

For the set of values above, the median indicator for "Marriages" is 146 and for "Divorces" is 46. Also, the distribution of quartiles is for "Marriages": (44,96.5,146,253.25,653) and for "Divorces": (4,27,46,65.75,205). The arithmetic mean and the standard deviation for "Marriages" are: (194,139.44) and for "Divorces": (53,36.39). This means that with a probability greather than 0.68 "Marriages" are in the range [55,333] and for "Divorces" in [17,89].

Percentiles length indicators analysis (Figure 72) show that, indeed the concentration is around the middle of the data.

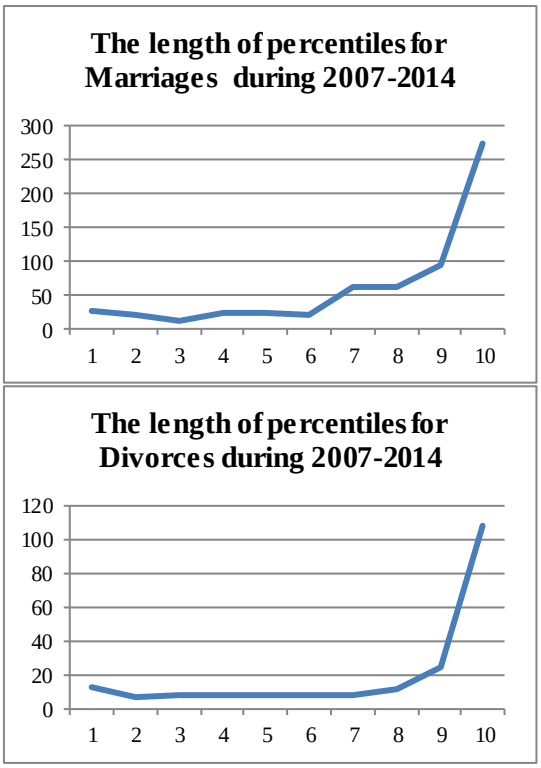


Figure 72

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 73.

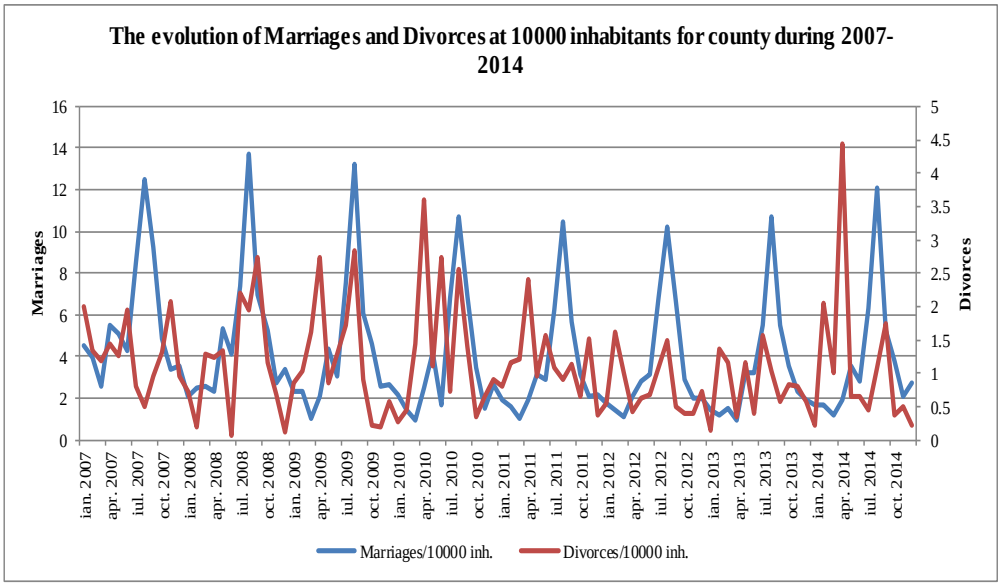


Figure 73

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.018594615x+5.014859649 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.004967716x+1.357392544 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 3 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (0.95,2.0675,3.1,5.3575,13.74) and for "Divorces/10000 inh.": (0.08,0.5775,0.98,1.395,4.44). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (4,2.95) and for "Divorces/10000 inh.": (1,0.77). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [1,7] and for "Divorces/10000 inh." in [0,2].

Percentiles length indicators analysis (Figure 74) show that, indeed the concentration is around the middle of the data.

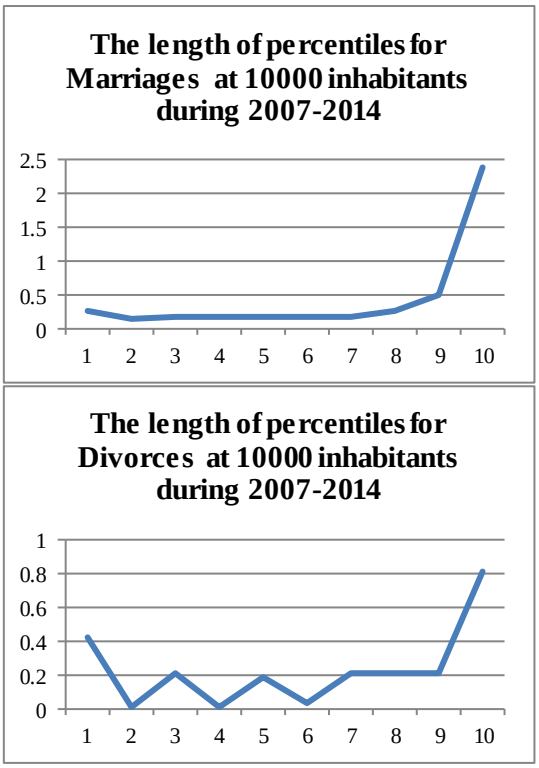


Figure 74

A comparison of the indicator "Marriages" with the national level shows that it is worse than the national, being better only in 22.92% cases. For "Divorces" the indicator is better than the national, being better in 62.5% cases.

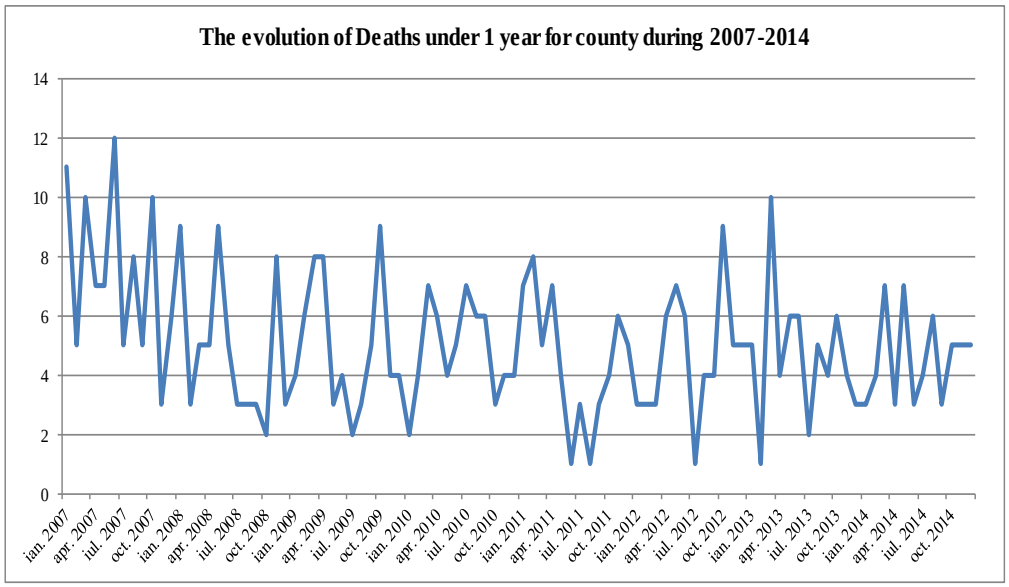


Figure 75

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.022951709x+6.175657895 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 5 and the distribution of quartiles is for "Deaths under 1 year": (1,3,5,6,12). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (5,2.3) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [3,7]. Percentiles length indicators analysis (Figure 76) show that, indeed the concentration is around the middle of the data.

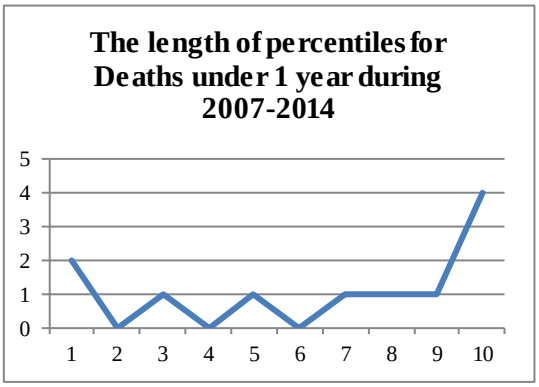


Figure 76

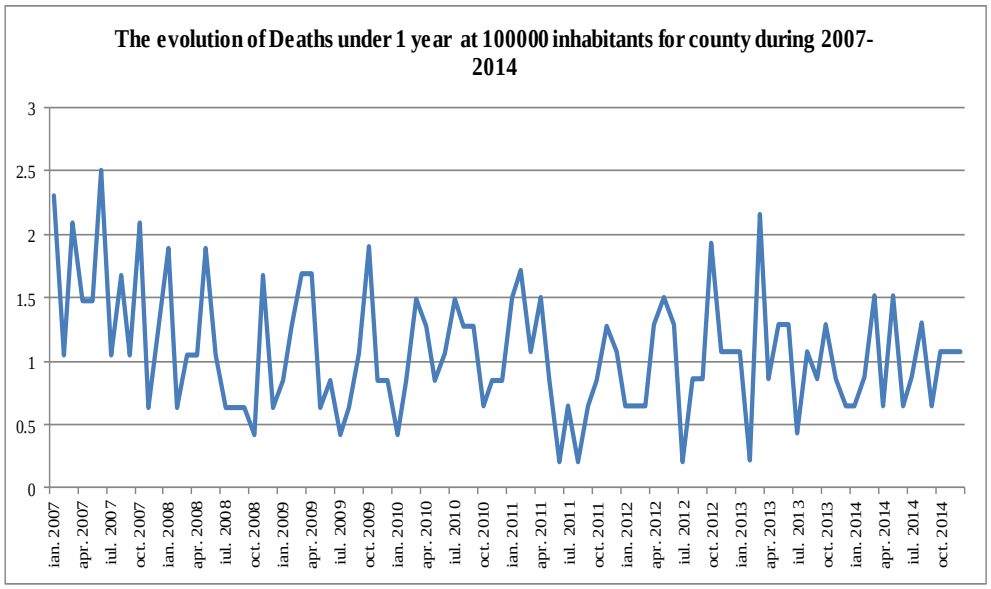


Figure 77

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.004414677x+1.290570175 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0.21,0.65,1.05,1.2925,2.51). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.49) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is worse than the national, being better only in 23.96% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 42. The evolution of Botosani County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	4540	-
2008	4791	5.52
2009	4607	-3.84
2010	4299	-6.69
2011	4348	1.13

2012	4266	-1.87
2013	4633	8.6
2014	4508	-2.69

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is a dependence of Natural increase from GDP offset by 2 years and the regression equation is:5.2523dGDP+20.3341. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is not a dependence of the variation of GDP.

2.8. Analysis of Natural Movement of Braila County Population

Statistics of natural movement corresponding to Braila County are the following:

Table 43. The natural movement of Braila County population during 2007-2008

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,07	232	471	-239	186	85	5	ian,08	204	495	-291	65	6	0
feb,07	208	419	-211	327	86	2	feb,08	256	392	-136	107	45	3
mar,07	278	439	-161	188	80	4	mar,08	262	437	-175	86	137	5
apr,07	247	359	-112	176	74	3	apr,08	251	373	-122	37	65	4
mai,07	285	400	-115	115	78	2	mai,08	276	382	-106	134	101	3
iun,07	274	370	-96	241	66	5	iun,08	199	355	-156	189	54	1
iul,07	273	385	-112	237	33	5	iul,08	248	346	-98	214	56	3

aug,07	285	330	-45	285	29	2	aug,08	238	383	-145	366	80	2
sept,07	267	359	-92	302	65	2	sept,08	274	350	-76	265	53	3
oct,07	243	366	-123	310	64	4	oct,08	250	364	-114	272	59	3
nov,07	218	356	-138	217	67	1	nov,08	336	376	-40	161	65	2
dec,07	225	421	-196	125	72	3	dec,08	249	432	-183	92	76	3

Source: INSSE

Table 44. The natural movement of Braila County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	229	438	-209	74	13	1	ian,10	244	402	-158	70	10	2
feb,09	312	385	-73	103	87	5	feb,10	240	406	-166	65	45	3
mar,09	262	469	-207	54	57	3	mar,10	254	408	-154	54	33	1
apr,09	225	406	-181	61	114	8	apr,10	204	384	-180	115	54	2
mai,09	249	380	-131	105	44	1	mai,10	221	392	-171	110	65	6
iun,09	232	327	-95	167	102	3	iun,10	248	371	-123	62	81	4
iul,09	322	359	-37	187	67	3	iul,10	266	381	-115	209	67	4
aug,09	280	332	-52	321	93	0	aug,10	295	405	-110	235	80	3
sept,09	307	308	-1	291	35	1	sept,10	228	329	-101	209	21	4
oct,09	250	391	-141	292	20	3	oct,10	229	406	-177	214	45	3
nov,09	252	407	-155	138	17	1	nov,10	272	422	-150	73	41	6
dec,09	268	451	-183	79	34	2	dec,10	252	443	-191	62	69	6

Source: INSSE

Table 45. The natural movement of Braila County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	202	395	-193	52	1	2	ian,12	219	455	-236	40	9	6
feb,11	190	398	-208	49	53	4	feb,12	192	512	-320	53	66	4
mar,11	207	412	-205	40	109	4	mar,12	193	473	-280	48	68	3
apr,11	164	403	-239	61	79	3	apr,12	157	414	-257	80	73	1
mai,11	180	421	-241	64	86	3	mai,12	262	370	-108	76	53	10
iun,11	225	358	-133	109	93	2	iun,12	204	399	-195	117	61	1
iul,11	245	404	-159	170	46	1	iul,12	225	398	-173	144	66	1
aug,11	256	335	-79	258	113	3	aug,12	284	359	-75	248	58	0
sept,11	261	321	-60	223	47	1	sept,12	224	328	-104	240	35	4
oct,11	239	382	-143	205	64	4	oct,12	240	361	-121	189	42	4
nov,11	196	383	-187	86	43	2	nov,12	200	329	-129	81	56	2
dec,11	205	423	-218	59	76	2	dec,12	170	400	-230	71	65	3

Source: INSSE

Table 46. The natural movement of Braila County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	244	450	-206	40	11	3	ian,14	192	426	-234	54	19	1
feb,13	155	380	-225	43	62	7	feb,14	182	373	-191	57	52	2
mar,13	182	414	-232	55	73	2	mar,14	191	449	-258	50	41	2
apr,13	130	471	-341	39	86	3	apr,14	157	423	-266	66	74	1
mai,13	199	374	-175	66	76	5	mai,14	201	381	-180	96	65	7
iun,13	191	351	-160	146	79	3	iun,14	194	371	-177	99	66	3
iul,13	253	352	-99	149	33	4	iul,14	230	364	-134	189	48	0
aug,13	224	373	-149	278	81	2	aug,14	238	372	-134	268	64	3

sept,13	226	314	-88	182	28	3	sept,14	215	322	-107	207	66	0
oct,13	247	389	-142	204	32	2	oct,14	237	413	-176	205	66	1
nov,13	186	382	-196	112	54	2	nov,14	188	395	-207	103	49	2
dec,13	161	424	-263	65	59	1	dec,14	155	409	-254	56	41	1

Source: INSSE

Table 47. The population trends of Braila County during 2007-2014

Year	Population	Year	Population
2007	381908	2011	372373
2008	379622	2012	369551
2009	377274	2013	366467
2010	375170	2014	363235

Source: INSSE

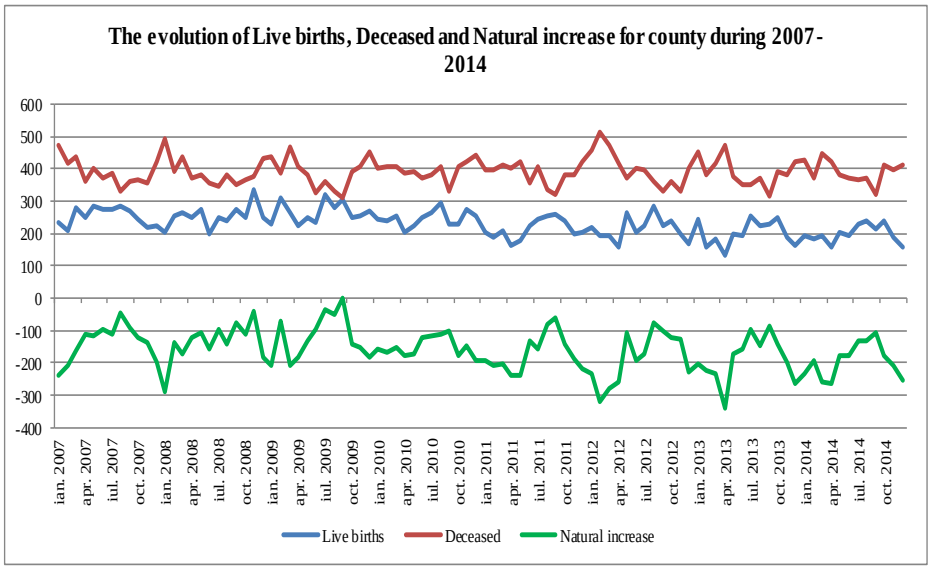


Figure 78

From figure 78 we can see a sinusoidal evolution of the indicator. #VALUE!

Regression analysis relative to indicator “Live births” gives us an equation: y=-0.789371948x+268.8782895 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=-0.032481009x+392.8982456 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Natural increase" gives us an equation: y=-0.756890939x+-124.0199561 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

For the set of values above, the median indicator for "Live births" is 232, for "Deceased" is 387 and for "Natural increase": -159. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (130,200.75,232,254.5,336), for "Deceased": (308,364,387,414,512) and for "Natural increase": (-341,-205.25,-158.5,-113.5,-1).

The arithmetic mean and the standard deviation for "Live births" are: (231,39.74), for "Deceased": (391,40.77) and for "Natural increase": (-161,64.48). This means that with a probability greather than 0.68 "Live births" are in the range [191,271], for "Deceased" in [350,432] and for "Natural increase" in [-225,-97].

Percentiles length indicators analysis (Figure 79) show that, indeed the concentration is around the middle of the data.

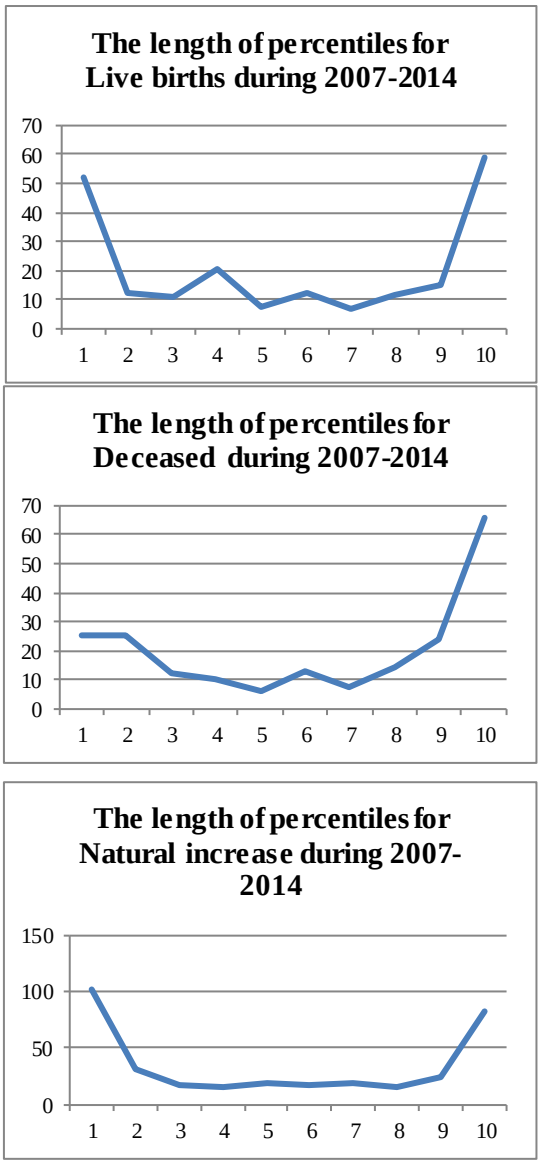


Figure 79

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 80.

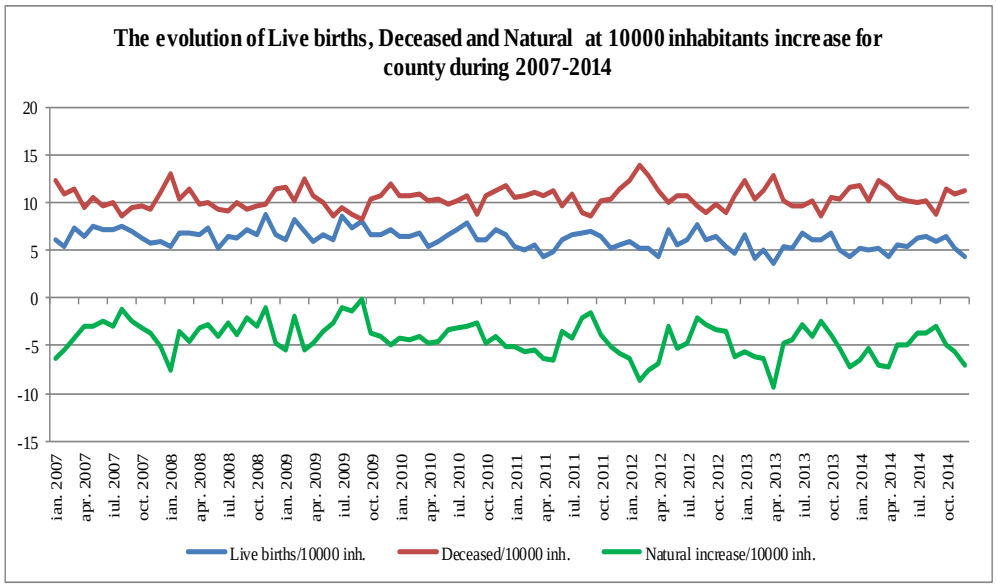


Figure 80

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.017605806x+7.023881579 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=0.005247897x+10.23412281 where x is the number of month (Jan, 2007=1), therefore an upward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.022873101x+-3.208883772 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 6, for "Deceased/10000 inh." is 10 and for "Natural increase/10000 inh.": -4. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (3.55,5.4175,6.22,6.795,8.85), for "Deceased/10000 inh.": (8.16,9.705,10.395,11.2125,13.85) and for "Natural increase/10000 inh.": (-9.31,-5.495,-4.215,-2.9875,-0.03).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (6,1.01), for "Deceased/10000 inh.": (10,1.11) and for "Natural increase/10000 inh.": (-4,1.76). This means that with a probability greather than 0.68 "Live

births/10000 inh." are in the range [5,7], for "Deceased/10000 inh." in [9,11] and for "Natural increase/10000 inh." in [-6,-2].

Percentiles length indicators analysis (Figure 81) show that, indeed the concentration is around the middle of the data.

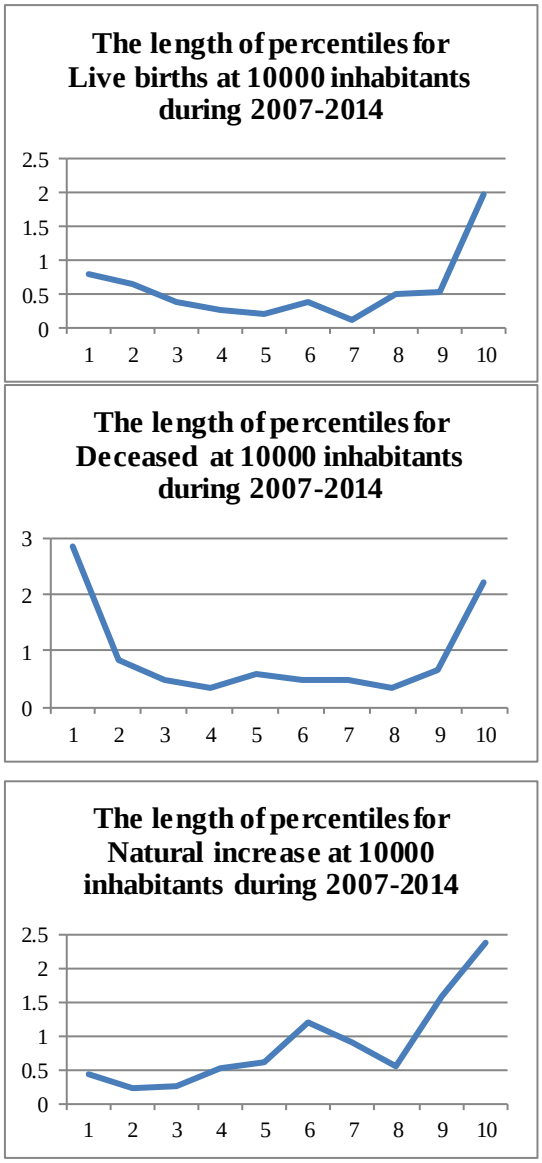


Figure 81

A comparison of the indicator "Live births" with the national level shows that it is worse than the national, being better only in 2.08% cases. For "Deceased" the indicator is worse than the national, being better only in 3.13% cases. Finally, for "Natural increase", the indicator is worse than the national, being better only in 1.04% cases.

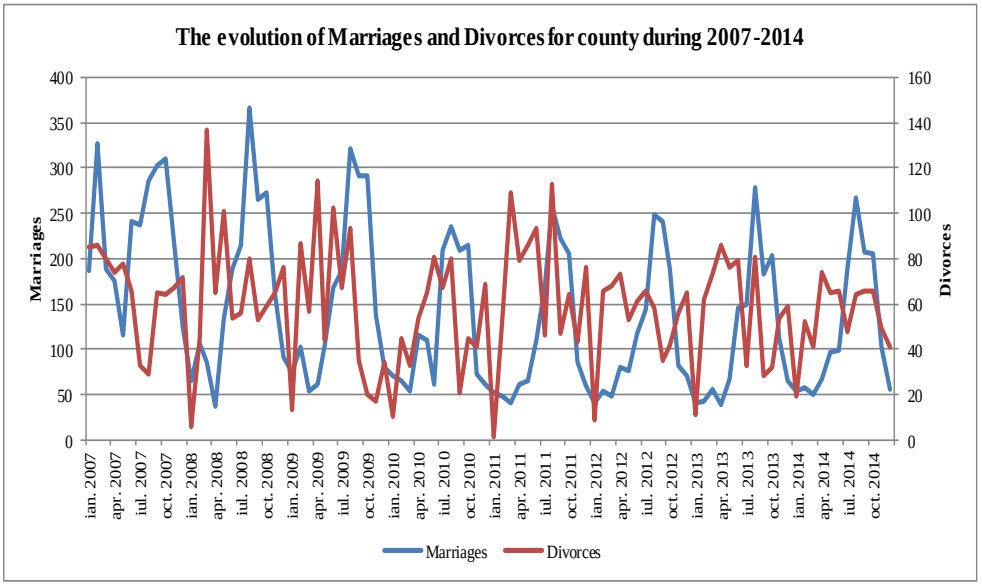


Figure 82

Regression analysis relative to indicator "Marriages" gives us an equation: y=-0.940647043x+187.6942982 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.126431091x+65.26732456 where x is the number of month (Jan, 2007=1), therefore a downward trend.

For the set of values above, the median indicator for "Marriages" is 114 and for "Divorces" is 64. Also, the distribution of quartiles is for "Marriages": (37,65,113.5,207.5,366) and for "Divorces": (1,43.75,64,74.5,137). The arithmetic mean and the standard deviation for "Marriages" are: (142,85.76) and for "Divorces": (59,25.36). This means that with a probability greather than 0.68 "Marriages" are in the range [56,228] and for "Divorces" in [34,84].

Percentiles length indicators analysis (Figure 83) show that, indeed the concentration is around the middle of the data.

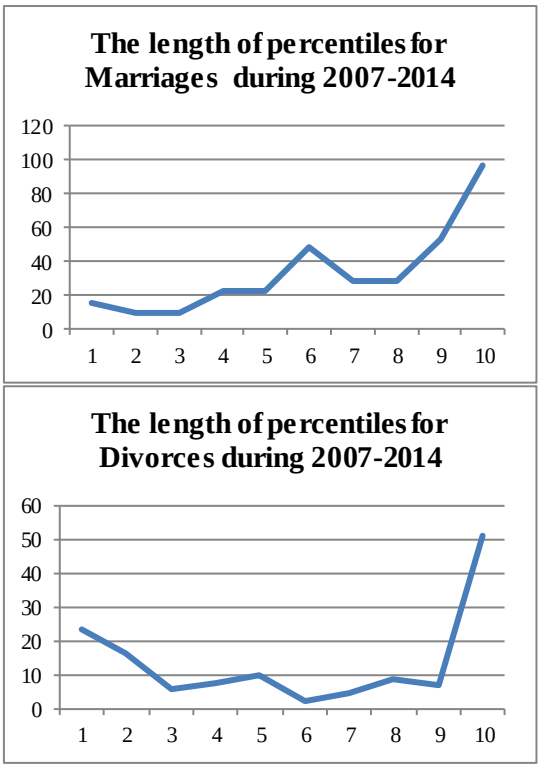


Figure 83

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 84.

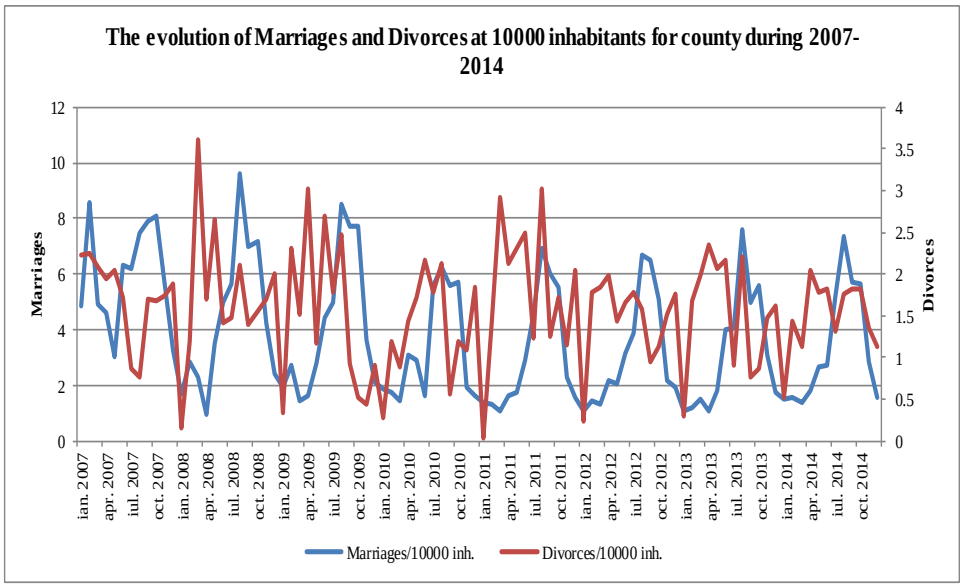


Figure 84

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.022752306x+4.898903509 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.002449267x+1.702539474 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 3 and for "Divorces/10000 inh." is 2. Also, the distribution of quartiles is for "Marriages/10000 inh.": (0.97,1.7275,3.035,5.5875,9.64) and for "Divorces/10000 inh.": (0.03,1.165,1.695,2.01,3.61). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (4,2.27) and for "Divorces/10000 inh.": (2,0.67). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [2,6] and for "Divorces/10000 inh." in [1,3].

Percentiles length indicators analysis (Figure 85) show that, indeed the concentration is around the middle of the data.

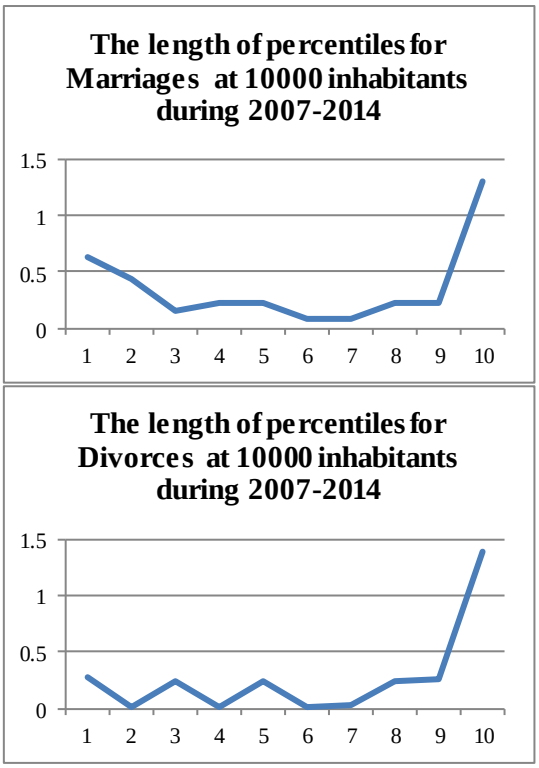


Figure 85

A comparison of the indicator "Marriages" with the national level shows that it is worse than the national, being better only in 18.75% cases. For "Divorces" the indicator is worse than the national, being better only in 21.88% cases.

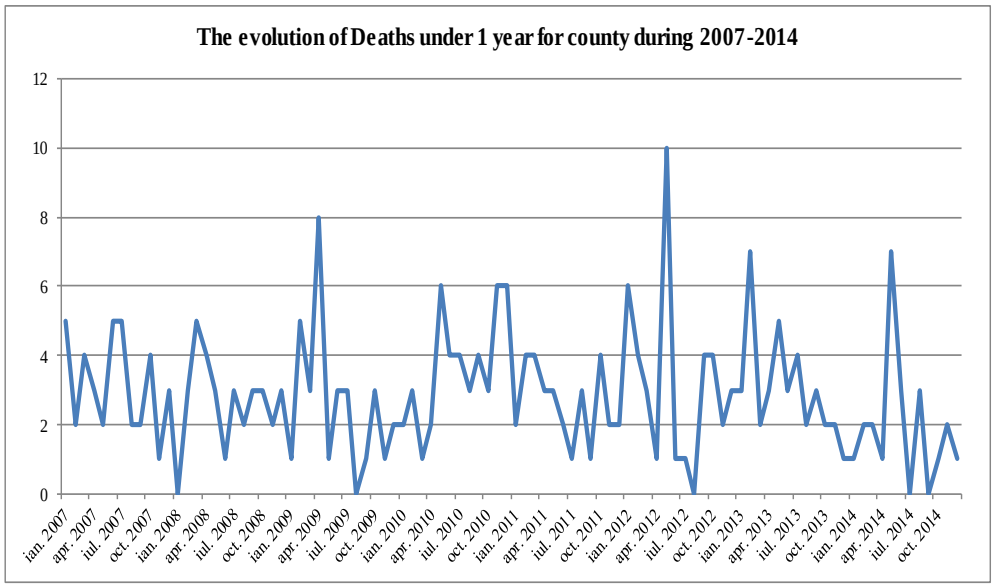


Figure 86

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.006965545x+3.202412281 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 3 and the distribution of quartiles is for "Deaths under 1 year": (0,2,3,4,10). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (3,1.8) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [1,5]. Percentiles length indicators analysis (Figure 87) show that, indeed the concentration is around the middle of the data.

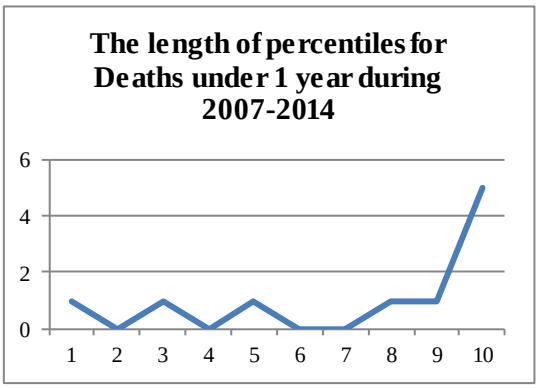


Figure 87

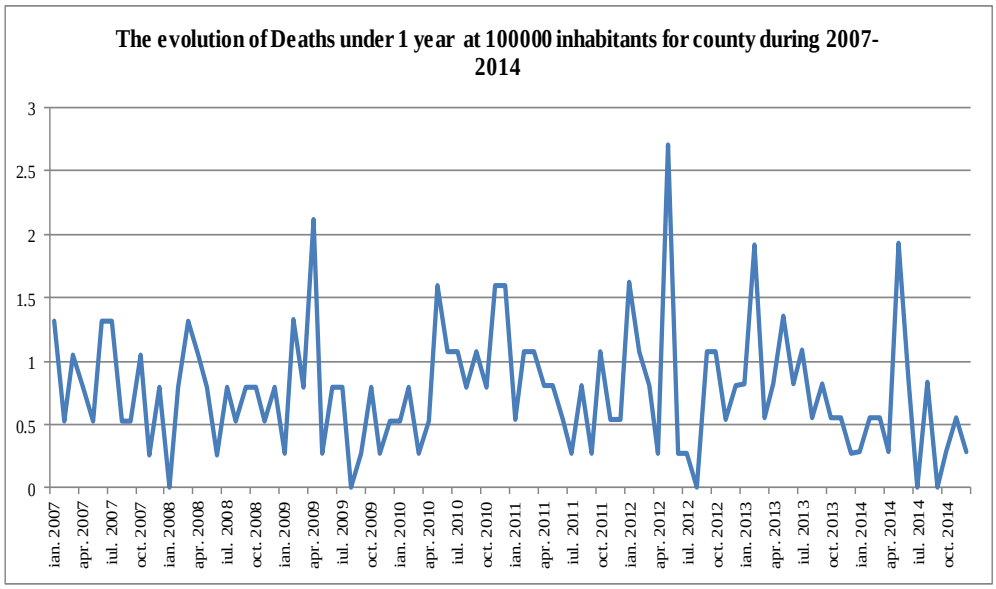


Figure 88

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.001445537x+0.838129386 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0,0.52,0.79,1.055,2.71). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.48) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is about the same with the national, being better in 53.13% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 48. The evolution of Braila County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	5621	-
2008	5774	2.73
2009	5603	-2.97
2010	4911	-12.35

2011	5289	7.71
2012	4971	-6.03
2013	5143	3.47
2014	5003	-2.72

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is a dependence of Live births from GDP offset by 1 year and the regression equation is:0.764dGDP+-2.8877. Searching dependence annual variations of "Deceased" from GDP, we find that there is a dependence of Deceased from GDP in the current year and the regression equation is: -0.2673dGDP+-0.2966. Searching dependence annual variations of "Natural increase" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is a dependence of Divorces from GDP offset by 1 year and the regression equation is:-2.2706dGDP+-4.7856. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is a dependence of Deaths under 1 year from GDP in the current year and the regression equation is: -3.2845dGDP+-8.1515.

2.9. Analysis of Natural Movement of Brasov County Population

Statistics of natural movement corresponding to Brasov County are the following:

Table 49. The natural movement of Brasov County population during 2007-2008

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1
ian,07	505	565	155	261	138	10	ian,08	547	576	-29	130	19	9
feb,07	415	503	-60	874	108	6	feb,08	577	495	82	187	170	10
mar,07	479	503	-88	472	92	6	mar,08	521	590	-69	181	24	8
apr,07	417	489	-24	346	122	7	apr,08	539	511	28	113	49	3
mai,07	511	464	-72	339	135	2	mai,08	563	451	112	365	148	3

iun,07	494	413	47	467	150	8	iun,08	545	472	73	463	42	5
iul,07	582	481	81	744	185	10	iul,08	621	488	133	586	143	5
aug,07	540	415	101	760	85	3	aug,08	563	450	113	853	35	5
sept,07	485	432	125	716	115	7	sept,08	597	452	145	564	30	6
oct,07	520	510	53	419	134	3	oct,08	573	500	73	384	19	7
nov,07	518	508	10	284	188	5	nov,08	514	434	80	226	86	2
dec,07	489	517	10	179	178	6	dec,08	527	529	-2	142	46	2

Source: INSSE

Table 50. The natural movement of Brasov County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	544	575	-31	146	4	6	ian,10	490	553	-63	149	14	1
feb,09	514	469	45	195	44	6	feb,10	517	471	46	158	59	4
mar,09	544	489	55	128	78	12	mar,10	579	510	69	111	45	3
apr,09	464	466	-2	138	35	7	apr,10	503	502	1	271	51	3
mai,09	509	463	46	331	496	1	mai,10	508	474	34	328	107	2
iun,09	504	453	51	349	391	5	iun,10	544	433	111	179	105	3
iul,09	635	442	193	625	67	3	iul,10	599	457	142	673	75	2
aug,09	674	405	269	766	197	4	aug,10	630	460	170	679	158	3
sept,09	647	467	180	560	103	7	sept,10	540	500	40	488	80	2
oct,09	600	494	106	424	108	2	oct,10	558	498	60	347	42	6
nov,09	524	490	34	193	40	4	nov,10	540	529	11	133	84	5
dec,09	495	578	-83	142	46	7	dec,10	538	531	7	102	57	7

Source: INSSE

Table 51. The natural movement of Brasov County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian, 11	498	513	-15	106	30	5	ian,12	500	565	-65	115	11	6
feb, 11	517	488	29	141	97	6	feb,12	464	563	-99	158	49	5
mar ,11	465	504	-39	125	69	4	mar,12	445	543	-98	93	94	3
apr, 11	461	472	-11	130	77	6	apr,12	466	476	-10	163	33	5
mai ,11	499	507	-8	258	75	8	mai,12	521	430	91	239	61	2
iun, 11	523	432	91	342	113	3	iun,12	491	412	79	323	66	0
iul, 11	518	462	56	551	120	1	iul,12	601	464	137	529	83	4
aug, 11	674	478	196	624	199	4	aug,12	651	472	179	616	52	7
sept ,11	543	409	134	466	158	3	sept,12	524	396	128	496	61	5
oct, 11	534	522	12	301	95	4	oct,12	543	515	28	256	149	2
nov ,11	491	498	-7	142	204	13	nov,12	463	497	-34	161	151	3
dec, 11	427	510	-83	144	137	5	dec,12	402	540	-138	131	73	4

Source: INSSE

Table 52. The natural movement of Brasov County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	581	571	10	114	39	5	ian,14	528	561	-33	108	37	3
feb,13	427	460	-33	160	136	7	feb,14	479	477	2	143	67	6
mar,13	420	485	-65	170	110	5	mar,14	522	535	-13	153	140	3
apr,13	463	549	-86	105	79	2	apr,14	458	536	-78	143	95	0
mai,13	466	484	-18	224	125	3	mai,14	468	506	-38	311	89	3
iun,13	438	499	-61	393	54	5	iun,14	514	457	57	317	63	9

iul,13	585	517	68	480	33	3	iul,14	628	476	152	504	94	2
aug,13	612	428	184	688	79	6	aug,14	598	442	156	717	56	4
sept,13	615	444	171	413	131	2	sept,14	569	469	100	417	55	4
oct,13	580	541	39	302	108	7	oct,14	541	496	45	287	148	2
nov,13	458	502	-44	173	73	4	nov,14	472	511	-39	195	113	5
dec,13	395	606	-211	120	70	7	dec,14	429	598	-169	125	104	1

Source: INSSE

Table 53. The population trends of Brasov County during 2007-2014

Year	Population	Year	Population
2007	623716	2011	627696
2008	624778	2012	628388
2009	625669	2013	629164
2010	626678	2014	629816

Source: INSSE

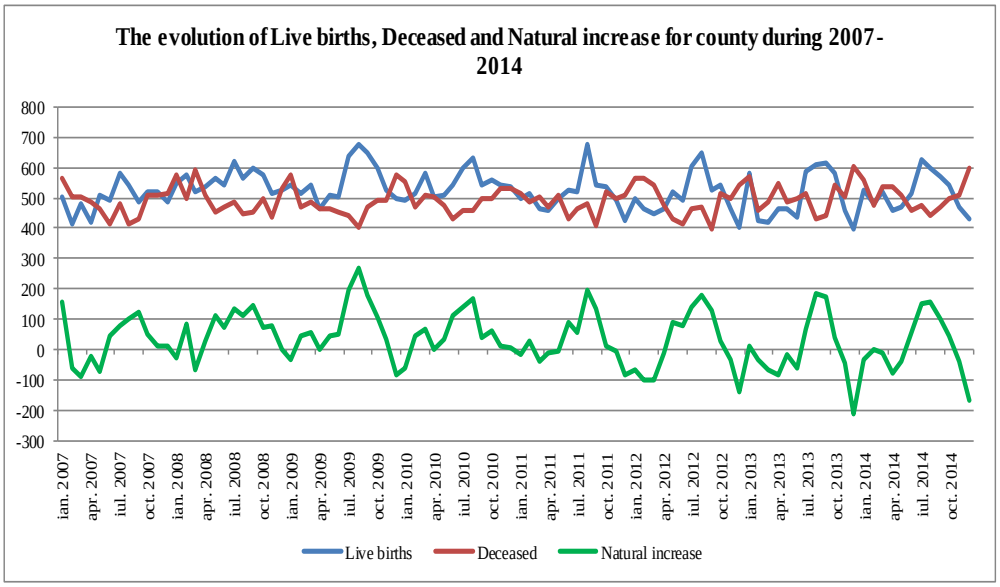


Figure 89

From figure 89 we can see a sinusoidal evolution of the indicator. Except months an 2007, iun 2007, iul 2007, aug 2007, sept 2007, oct 2007, nov 2007, dec 2007, feb

2008, apr 2008, mai 2008, iun 2008, iul 2008, aug 2008, sept 2008, oct 2008, nov 2008, feb 2009, mar 2009, mai 2009, iun 2009, iul 2009, aug 2009, sept 2009, oct 2009, nov 2009, feb 2010, mar 2010, apr 2010, mai 2010, iun 2010, iul 2010, aug 2010, sept 2010, oct 2010, nov 2010, dec 2010, feb 2011, iun 2011, iul 2011, aug 2011, sept 2011, oct 2011, mai 2012, iun 2012, iul 2012, aug 2012, sept 2012, oct 2012, ian 2013, iul 2013, aug 2013, sept 2013, oct 2013, feb 2014, iun 2014, iul 2014, aug 2014, sept 2014, oct 2014 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-0.256219479x+536.4787281 where x is the number of month (Jan, 2007=1), therefore a downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=0.192193435x+483.1265351 where x is the number of month (Jan, 2007=1), therefore an upward trend.

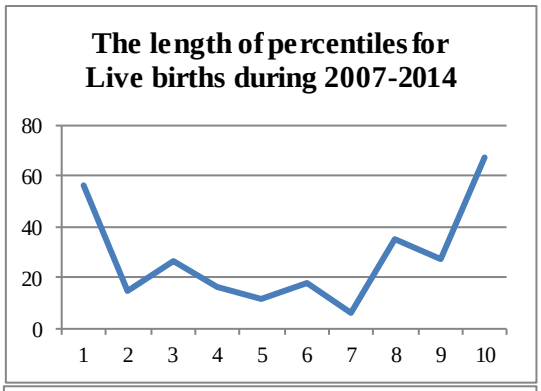
Regression analysis relative to indicator "Natural increase" gives us an equation: y=-0.559664948x+60.65416667 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

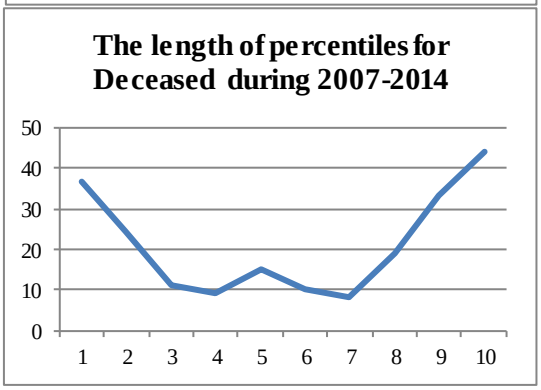
For the set of values above, the median indicator for "Live births" is 521, for "Deceased" is 492 and for "Natural increase": 34. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (395,483.5,520.5,563,674), for "Deceased": (396,462.75,492,515.5,606) and for "Natural increase": (-211,-31.5,34,93.25,269).

The arithmetic mean and the standard deviation for "Live births" are: (524,61.51), for "Deceased": (492,45.87) and for "Natural increase": (34,88.63). This means that with a probability greather than 0.68 "Live births" are in the range [462,586], for "Deceased" in [446,538] and for "Natural increase" in [-55,123].

Percentiles length indicators analysis (Figure 90) show that, indeed the concentration is around the middle of the data.





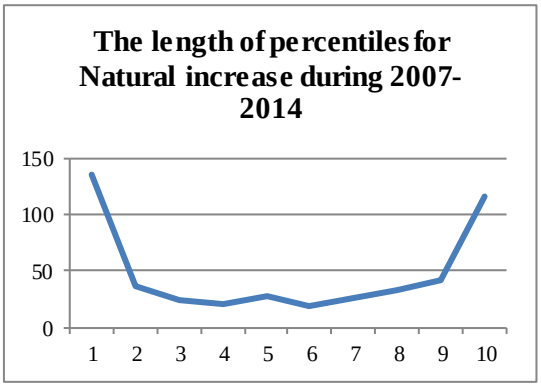


Figure 90

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 91.

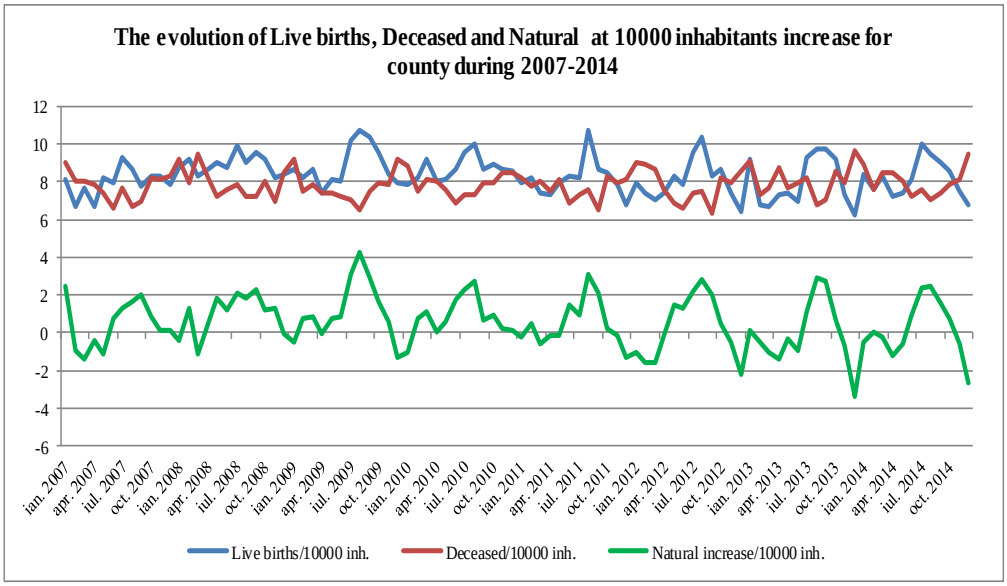


Figure 91

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.005055209x+8.604135965 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=0.002166915x+7.748550439 where x is the number of month (Jan, 2007=1), therefore a very small upward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.008978635x+0.970984649 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 8, for "Deceased/10000 inh." is 8 and for "Natural increase/10000 inh.": 1. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (6.28,7.755,8.3,9.01,10.77), for "Deceased/10000 inh.": (6.3,7.375,7.86,8.205,9.63) and for "Natural increase/10000 inh.": (-3.35,-0.505,0.54,1.485,4.3).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (8,0.98), for "Deceased/10000 inh.": (8,0.73) and for "Natural increase/10000 inh.": (1,1.41). This means that with a probability greather than 0.68 "Live births/10000 inh." are in the range [7,9], for "Deceased/10000 inh." in [7,9] and for "Natural increase/10000 inh." in [0,2].

Percentiles length indicators analysis (Figure 92) show that, indeed the concentration is around the middle of the data.

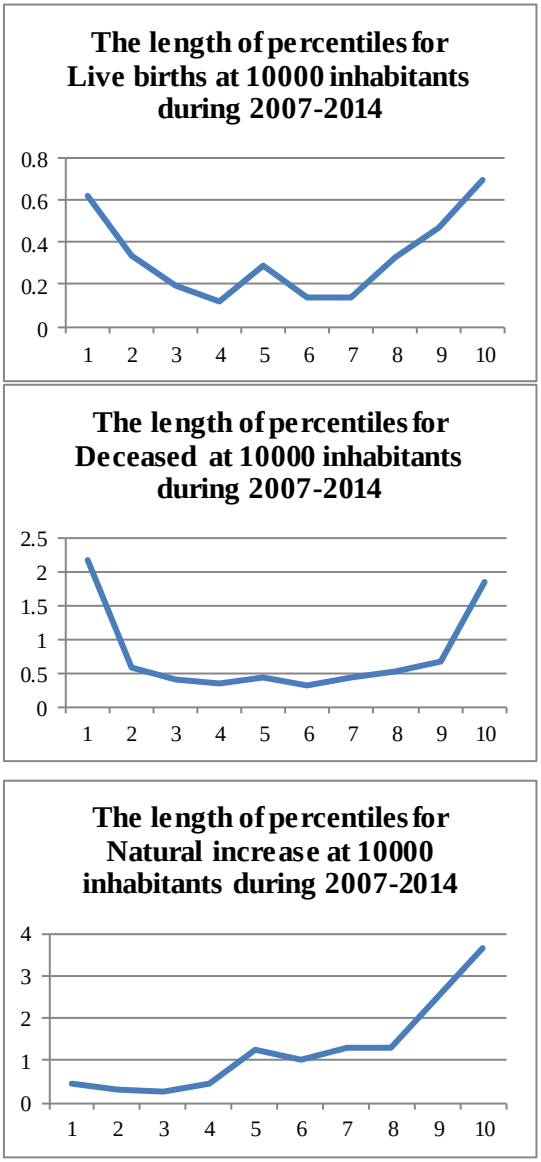


Figure 92

A comparison of the indicator "Live births" with the national level shows that it is better than the national, being better in 87.5% cases. For "Deceased" the indicator is

better than the national, being better in 100% cases. Finally, for "Natural increase", the indicator is better than the national, being better in 98.96% cases.

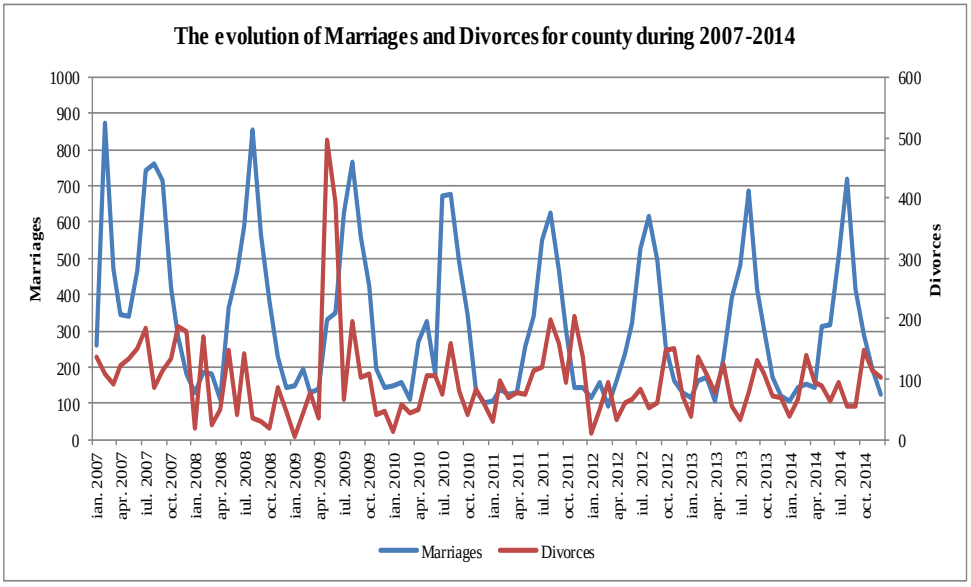


Figure 93

Regression analysis relative to indicator "Marriages" gives us an equation: y=-1.737316875x+407.6140351 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.320198047x+112.2171053 where x is the number of month (Jan, 2007=1), therefore a downward trend.

For the set of values above, the median indicator for "Marriages" is 266 and for "Divorces" is 84. Also, the distribution of quartiles is for "Marriages": (93,143.75,266,466.25,874) and for "Divorces": (4,51.75,83.5,126.5,496). The arithmetic mean and the standard deviation for "Marriages" are: (323,205.75) and for "Divorces": (97,69.57). This means that with a probability greather than 0.68 "Marriages" are in the range [117,529] and for "Divorces" in [27,167].

Percentiles length indicators analysis (Figure 94) show that, indeed the concentration is around the middle of the data.

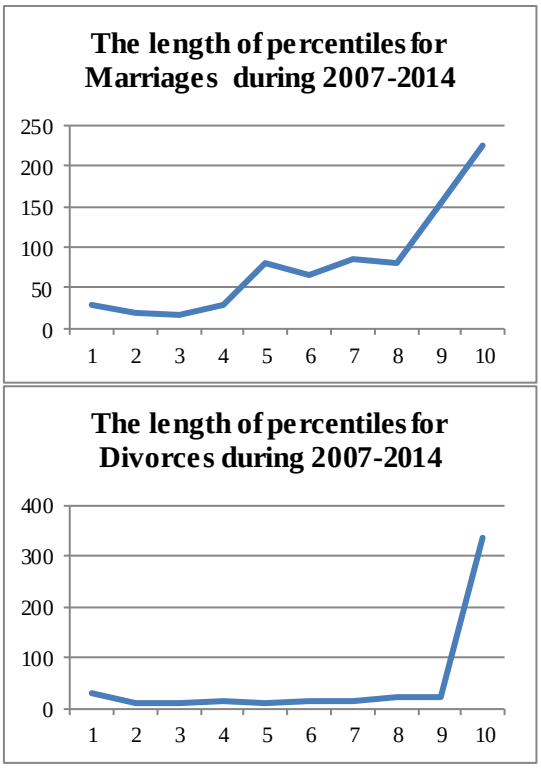


Figure 94

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 95.

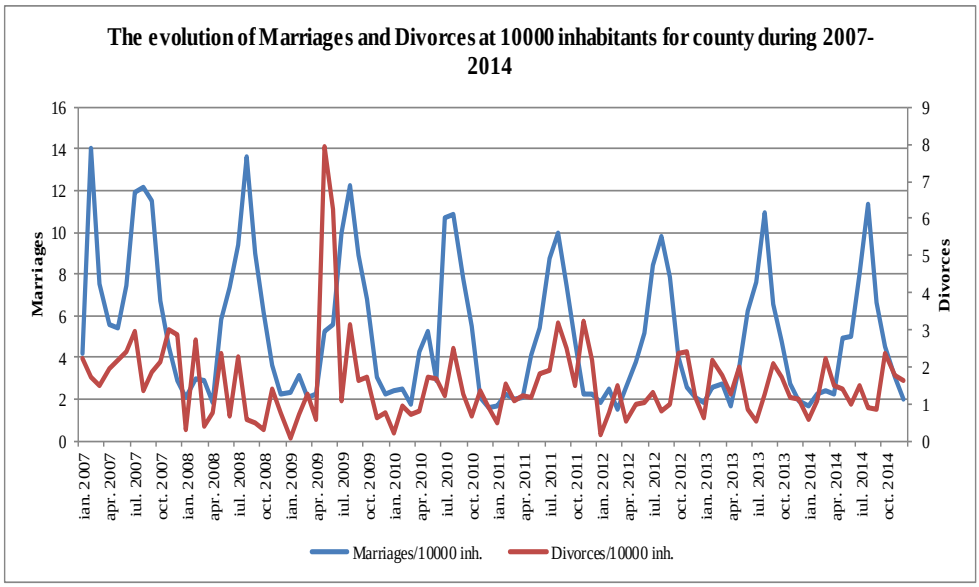


Figure 95

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.028391753x+6.537 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.005290355x+1.799186404 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 4 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (1.48,2.285,4.25,7.4375,14.01) and for "Divorces/10000 inh.": (0.06,0.825,1.33,2.0125,7.93). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (5,3.29) and for "Divorces/10000 inh.": (2,1.11). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [2,8] and for "Divorces/10000 inh." in [1,3].

Percentiles length indicators analysis (Figure 96) show that, indeed the concentration is around the middle of the data.

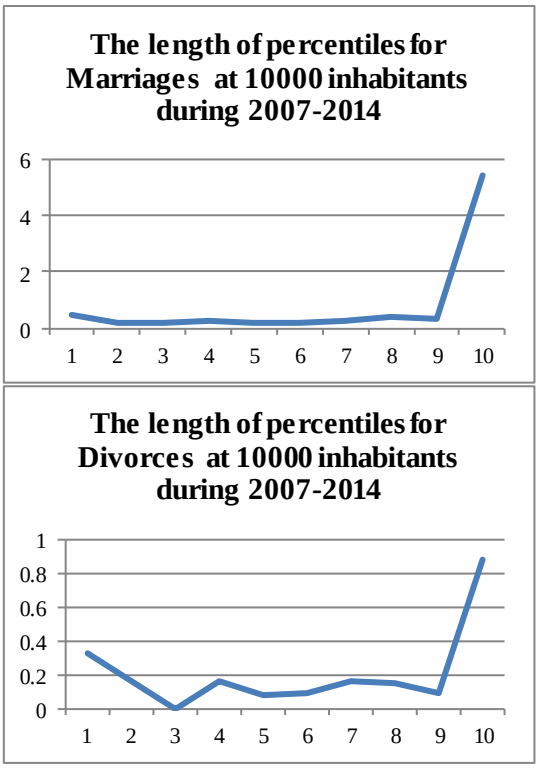


Figure 96

A comparison of the indicator "Marriages" with the national level shows that it is better than the national, being better in 71.88% cases. For "Divorces" the indicator is worse than the national, being better only in 38.54% cases.

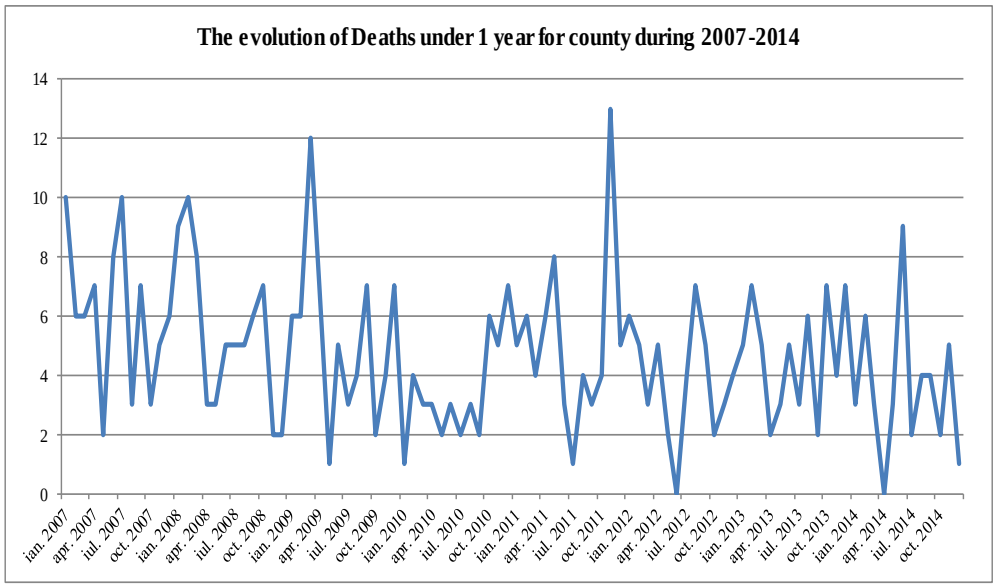


Figure 97

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.025237385x+5.901096491 where x is the number of month (Jan, 2007=1), therefore a very small downward trend. For the set of values above, the median indicator for "Deaths under 1 year" is 5 and the distribution of quartiles is for "Deaths under 1 year": (0,3,4.5,6,13). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (5,2.51) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [2,8].

Percentiles length indicators analysis (Figure 98) show that, indeed the concentration is around the middle of the data.

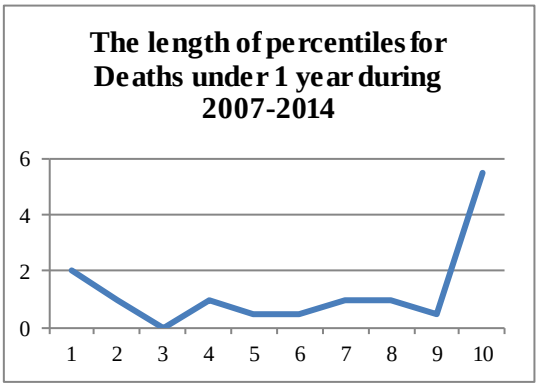


Figure 98

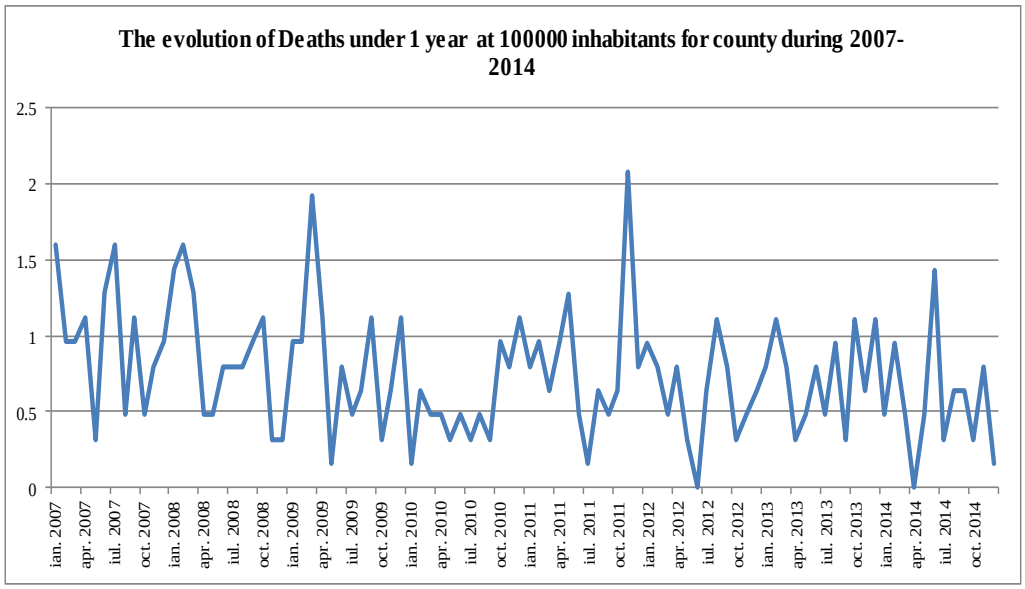


Figure 99

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.004089392x+0.945210526 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0,0.48,0.715,0.96,2.07). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.4) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is about the same with the national, being better in 52.08% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 54. The evolution of Brasov County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	13722	-
2008	14224	3.66
2009	13974	-1.75
2010	14162	1.34
2011	13760	-2.84

2012	14470	5.16
2013	14678	1.44
2014	14970	1.99

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is a dependence of Divorces from GDP in the current year and the regression equation is: -16.6313dGDP+27.5746. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is a dependence of Deaths under 1 year from GDP in the current year and the regression equation is: -7.3589dGDP+5.7058we find that there is a dependence of Deaths under 1 year from GDP offset by 2 years and the regression equation is:-9.2242dGDP+7.5178.

2.10. Analysis of Natural Movement of Bucharest County Population

Statistics of natural movement corresponding to Bucharest County are the following:

Table 55. The natural movement of Bucharest County population during 2007-2008

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,07	1551	1989	-438	642	287	12	ian,08	1699	1995	-296	493	163	10
feb,07	1312	1704	-392	919	259	8	feb,08	1575	1726	-151	894	399	11
mar,07	1520	1883	-363	831	285	12	mar,08	1544	1757	-213	1211	314	9
apr,07	1420	1765	-345	1391	333	10	apr,08	1510	1779	-269	813	317	14
mai,07	1566	1805	-239	1227	330	15	mai,08	1660	1683	-23	1565	291	14
iun,07	1641	1697	-56	1988	438	19	iun,08	1571	1698	-127	2582	252	9
iul,07	1799	2199	-400	2350	96	7	iul,08	2038	1637	401	2411	142	7
aug,07	1775	1639	136	2011	135	11	aug,08	1635	1738	-103	2690	157	10
sept,07	1710	1614	96	2505	301	13	sept,08	2003	1630	373	2349	318	10
oct,07	1781	1788	-7	1859	298	14	oct,08	1953	1757	196	2532	305	12
nov,07	1559	1702	-143	1078	403	6	nov,08	1645	1733	-88	1790	237	9
dec,07	1598	1836	-238	526	345	10	dec,08	1757	1913	-156	968	221	12

Source: INSSE

Table 56. The natural movement of Bucharest County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	1696	1911	-215	530	101	16	ian,10	1710	1921	-211	506	59	7
feb,09	1643	1647	-4	1002	326	8	feb,10	1629	1723	-94	616	248	8
mar,09	1737	1927	-190	701	237	10	mar,10	1744	1812	-68	494	274	11
apr,09	1650	1672	-22	1004	281	11	apr,10	1654	1744	-90	1272	320	11
mai,09	1623	1644	-21	1449	227	9	mai,10	1474	1725	-251	1043	221	12
iun,09	1778	1621	157	1822	226	11	iun,10	1921	1765	156	1020	288	9
iul,09	1900	1652	248	2199	157	4	iul,10	1872	1722	150	2211	242	7
aug,09	1896	1678	218	1903	134	21	aug,10	1836	1909	-73	1721	167	12
sept,09	2030	1610	420	2269	185	12	sept,10	1593	1558	35	1794	242	9
oct,09	2053	1764	289	1803	263	13	oct,10	1835	1836	-1	1338	198	7
nov,09	1713	1787	-74	858	276	11	nov,10	1946	1759	187	633	127	11
dec,09	1783	2004	-221	521	173	9	dec,10	1590	1796	-206	416	226	9

Source: INSSE

Table 57. The natural movement of Bucharest County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	1522	1885	-363	354	28	7	ian,12	1571	1850	-279	334	105	5
feb,11	1509	1722	-213	594	332	11	feb,12	1525	1976	-451	489	275	4
mar,11	1733	1907	-174	496	358	7	mar,12	1442	2043	-601	443	373	7
apr,11	1433	1690	-257	698	340	11	apr,12	1311	1775	-464	813	246	3
mai,11	1760	1758	2	882	494	11	mai,12	1533	1710	-177	789	292	7
iun,11	1538	1659	-121	1664	299	11	iun,12	1487	1705	-218	1609	236	5

iul,11	1419	1714	-295	1683	299	7	iul,12	1692	2015	-323	1471	285	6
aug,11	1403	1830	-427	1536	407	13	aug,12	1707	1826	-119	1575	340	5
sept,11	1609	1577	32	1743	362	5	sept,12	1836	1555	281	1774	338	8
oct,11	1485	1707	-222	1095	356	7	oct,12	1911	1737	174	1131	311	13
nov,11	1589	1809	-220	617	320	3	nov,12	1640	1733	-93	664	272	6
dec,11	2290	1879	411	424	230	6	dec,12	1311	1825	-514	387	241	4

Source: INSSE

Table 58. The natural movement of Bucharest County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	1792	1878	-86	353	89	11	ian,14	1660	1847	-187	363	91	7
feb,13	1380	1710	-330	475	292	14	feb,14	1367	1746	-379	547	182	7
mar,13	1321	1857	-536	738	282	8	mar,14	1491	1907	-416	645	217	9
apr,13	1405	1807	-402	594	257	6	apr,14	1553	1811	-258	808	190	9
mai,13	1413	1662	-249	909	236	9	mai,14	1468	1729	-261	1102	228	6
iun,13	1289	1663	-374	1791	259	9	iun,14	1549	1620	-71	1580	181	11
iul,13	1833	1676	157	1436	129	18	iul,14	1914	1738	176	1614	254	4
aug,13	1661	1671	-10	1801	263	6	aug,14	1556	1720	-164	1848	211	8
sept,13	1638	1635	-3	1541	200	7	sept,14	1802	1602	200	1618	265	12
oct,13	1913	1772	-141	1205	232	4	oct,14	1762	1892	-130	1345	260	10
nov,13	1540	1655	-115	781	252	6	nov,14	1509	1711	-202	962	218	3
dec,13	1354	1894	-540	368	213	9	dec,14	1343	1942	-599	617	324	6

Source: INSSE

Table 59. The population trends of Bucharest County during 2007-2014

Year	Population	Year	Population
2007	2158585	2011	2161874
2008	2160871	2012	2158758
2009	2160640	2013	2148098
2010	2161906	2014	2134030

Source: INSSE

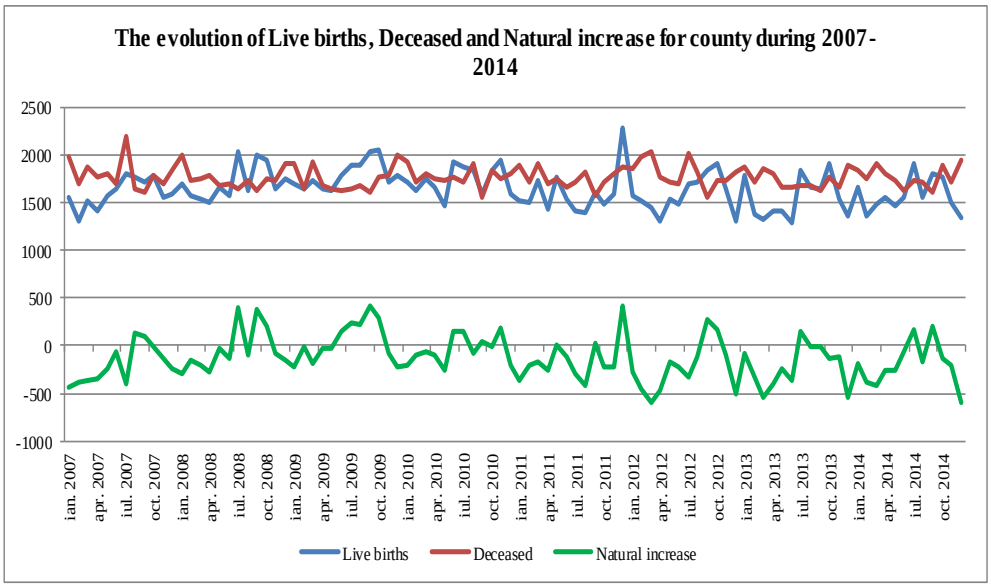


Figure 100

From figure 100 we can see a sinusoidal evolution of the indicator. Except months aug 2007, sept 2007, iul 2008, sept 2008, oct 2008, iun 2009, iul 2009, aug 2009, sept 2009, oct 2009, iun 2010, iul 2010, sept 2010, nov 2010, mai 2011, sept 2011, dec 2011, sept 2012, oct 2012, iul 2013, iul 2014, sept 2014 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-1.452462018x+1715.204825 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=-0.166128595x+1777.70307 where x is the number of month (Jan, 2007=1), therefore a downward trend.

Regression analysis relative to indicator "Natural increase" gives us an equation: y=-1.41712561x+-59.15482456 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

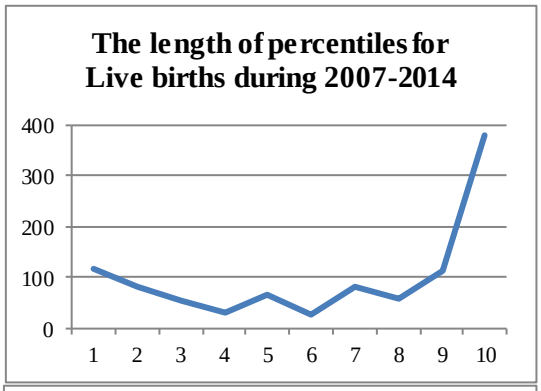
For the set of values above, the median indicator for "Live births" is 1637, for "Deceased" is 1745 and for "Natural increase": -147. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

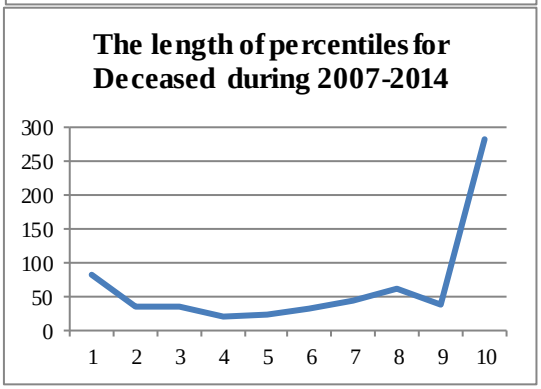
Also, the distribution of quartiles is for "Live births": (1289,1517.5,1636.5,1775.75,2290), for "Deceased":

(1555,1688.25,1745,1838.75,2199) and for "Natural increase": (-601,-263,-147,-3.75,420).

The arithmetic mean and the standard deviation for "Live births" are: (1645,195.03), for "Deceased": (1770,118.51) and for "Natural increase": (-128,231.68). This means that with a probability greather than 0.68 "Live births" are in the range [1450,1840], for "Deceased" in [1651,1889] and for "Natural increase" in [-360,104].

Percentiles length indicators analysis (Figure 101) show that, indeed the concentration is around the middle of the data.





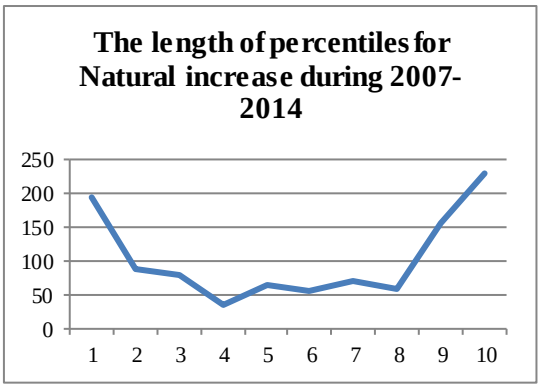


Figure 101

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 102.

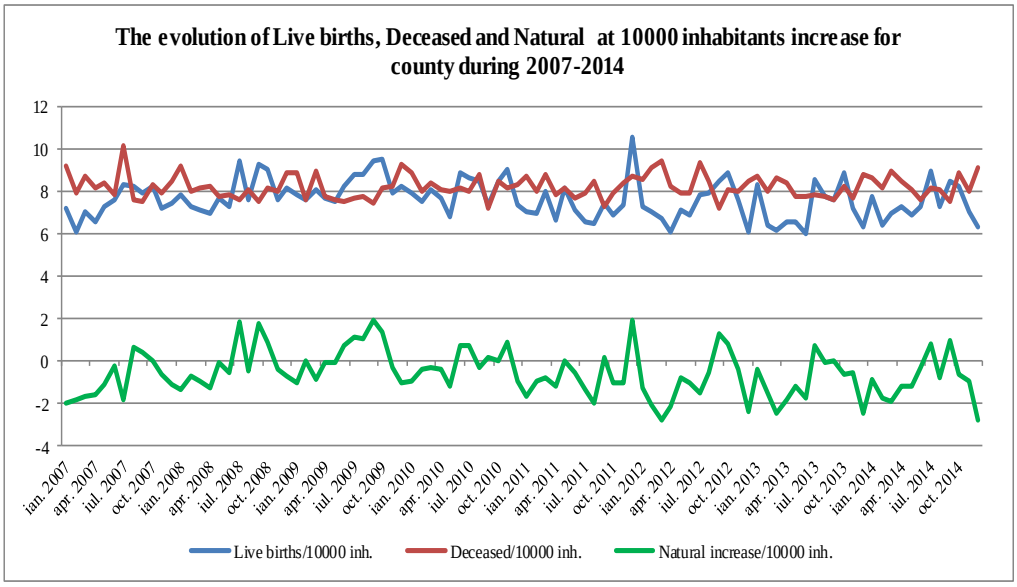


Figure 102

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.005914677x+7.916236842 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=0.000134699x+8.202842105 where x is the number of month (Jan, 2007=1), therefore a very small upward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.00666678x+-0.271140351 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 8, for "Deceased/10000 inh." is 8 and for "Natural increase/10000 inh.": -1. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (6,7.04,7.585,8.235,10.59), for "Deceased/10000 inh.": (7.2,7.815,8.13,8.525,10.19) and for "Natural increase/10000 inh.": (-2.81,-1.225,-0.68,-0.0175,1.94).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (8,0.9), for "Deceased/10000 inh.": (8,0.55) and for "Natural increase/10000 inh.": (-1,1.08). This means that with a probability greather than 0.68 "Live births/10000 inh." are in the range [7,9], for "Deceased/10000 inh." in [7,9] and for "Natural increase/10000 inh." in [-2,0].

Percentiles length indicators analysis (Figure 103) show that, indeed the concentration is around the middle of the data.

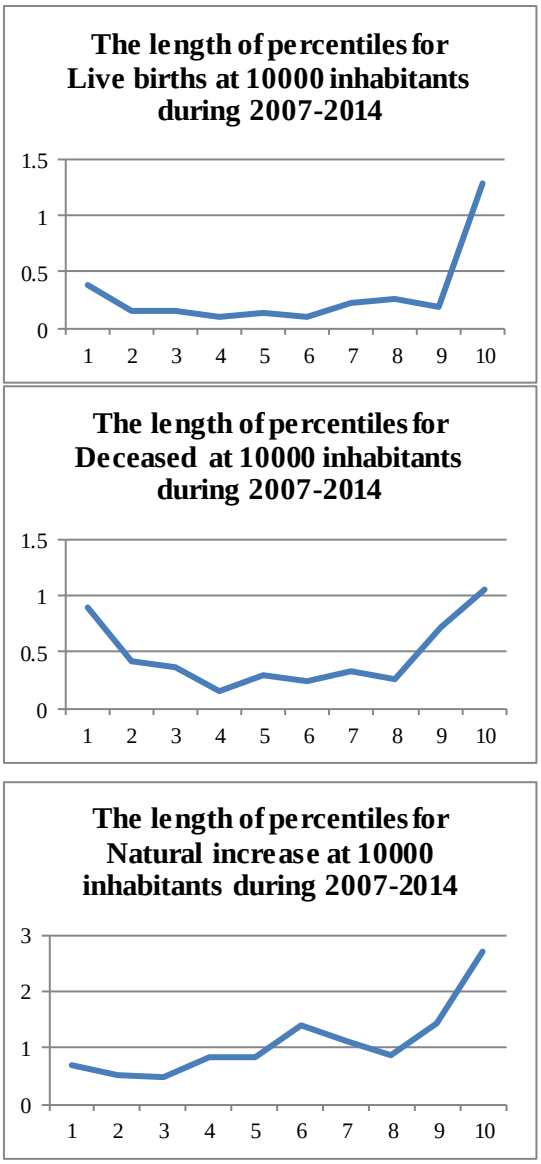


Figure 103

A comparison of the indicator "Live births" with the national level shows that it is about the same with the national, being better in 57.29% cases. For "Deceased" the indicator is better than the national, being better in 97.92% cases. Finally, for "Natural increase", the indicator is better than the national, being better in 87.5% cases.

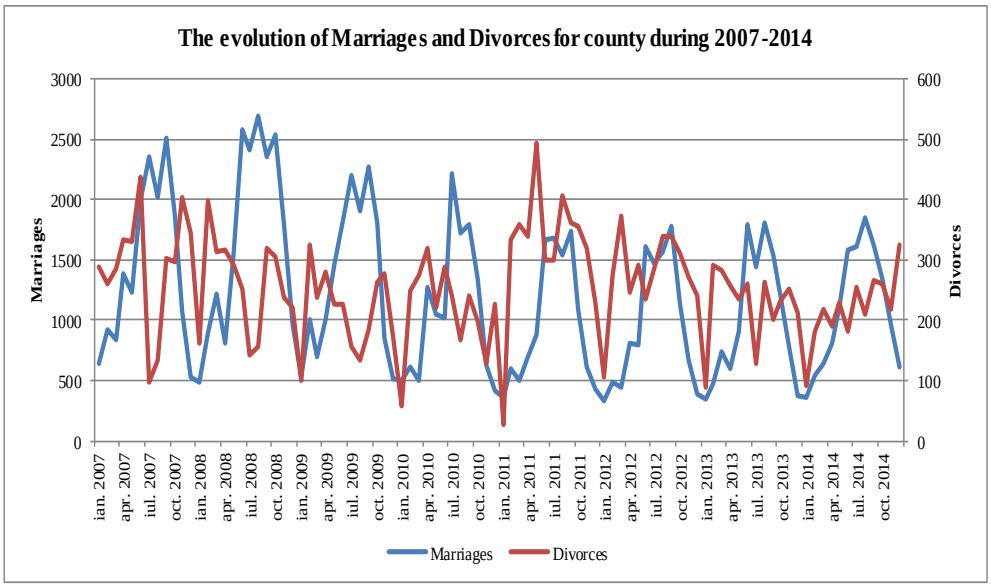


Figure 104

Regression analysis relative to indicator "Marriages" gives us an equation: y=-6.146812263x+1496.620395 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.35423223x+270.1802632 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

For the set of values above, the median indicator for "Marriages" is 1061 and for "Divorces" is 258. Also, the distribution of quartiles is for "Marriages": (334,629,1060.5,1692.5,2690) and for "Divorces": (28,212.5,258,306.5,494). The arithmetic mean and the standard deviation for "Marriages" are: (1199,634.62) and for "Divorces": (253,83.97). This means that with a probability greather than 0.68 "Marriages" are in the range [564,1834] and for "Divorces" in [169,337].

Percentiles length indicators analysis (Figure 105) show that, indeed the concentration is around the middle of the data.

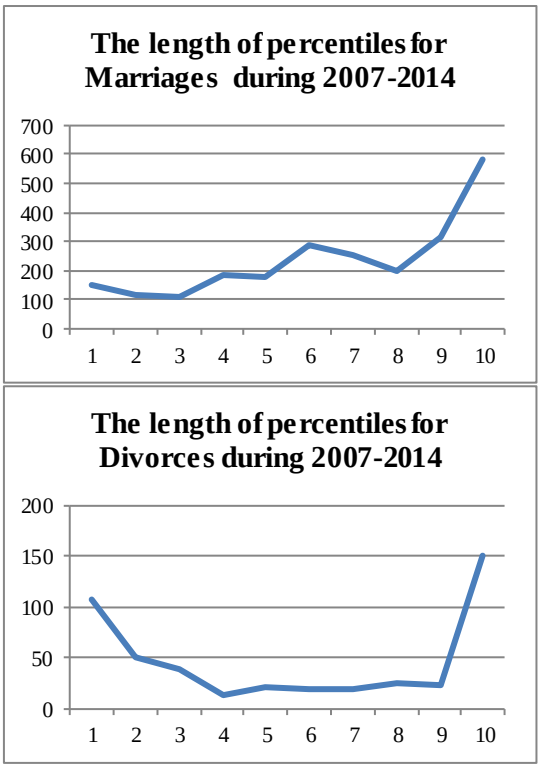


Figure 105

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 106.

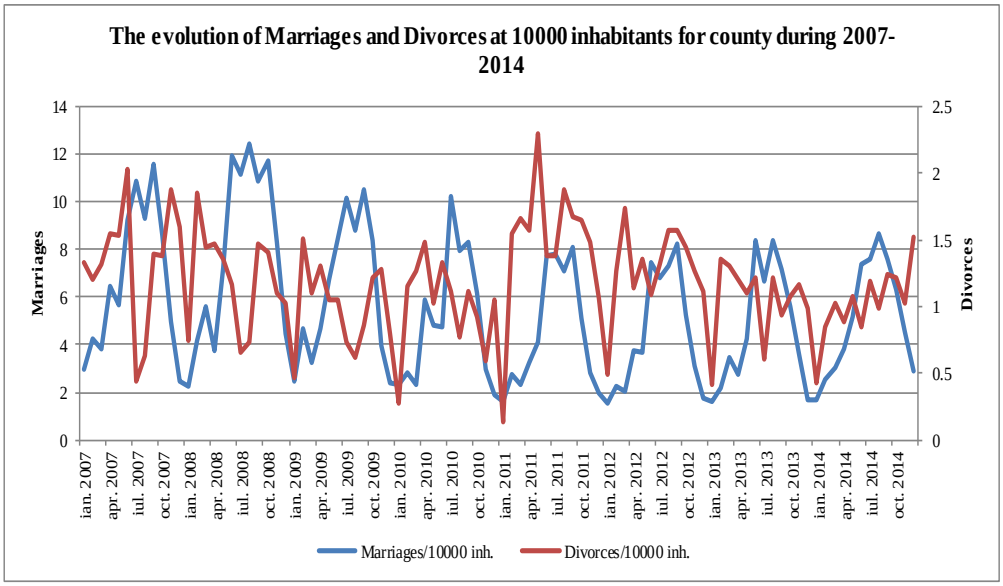


Figure 106

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.027909862x+6.911857456 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.001536082x+1.24825 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 5 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (1.55,2.92,4.905,7.825,12.45) and for "Divorces/10000 inh.": (0.13,0.99,1.2,1.4175,2.29). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (6,2.94) and for "Divorces/10000 inh.": (1,0.39). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [3,9] and for "Divorces/10000 inh." in [1,1].

Percentiles length indicators analysis (Figure 107) show that, indeed the concentration is around the middle of the data.

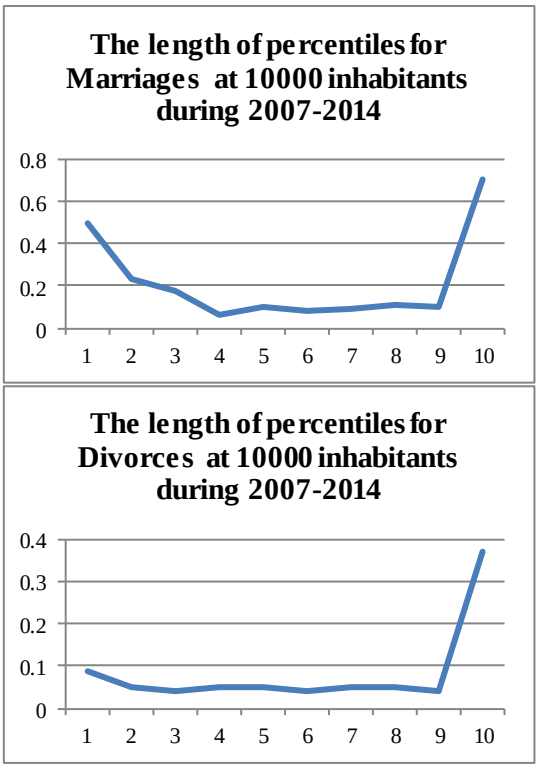


Figure 107

A comparison of the indicator "Marriages" with the national level shows that it is better than the national, being better in 78.13% cases. For "Divorces" the indicator is about the same with the national, being better in 45.83% cases.

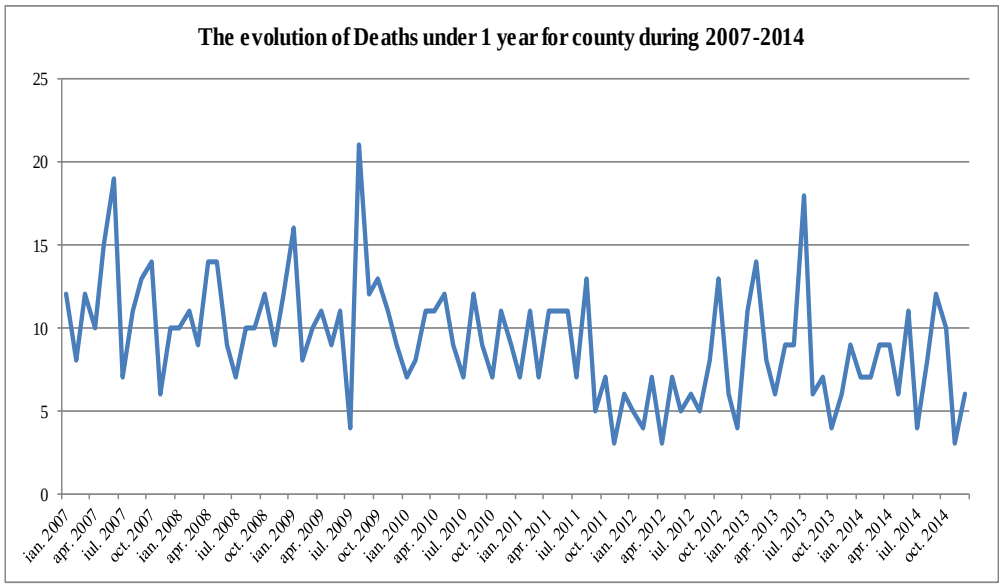


Figure 108

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.05151248x+11.69627193 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 9 and the distribution of quartiles is for "Deaths under 1 year": (3,7,9,11,21). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (9,3.45) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [6,12]. Percentiles length indicators analysis (Figure 109) show that, indeed the concentration is around the middle of the data.

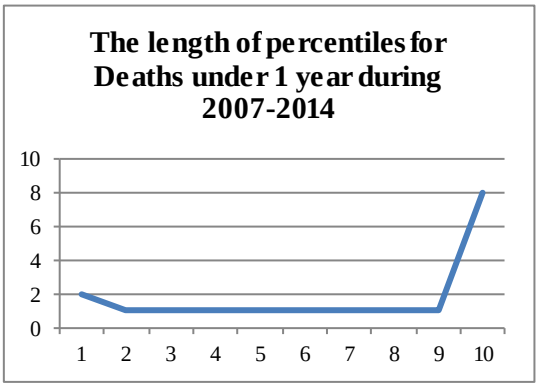


Figure 109

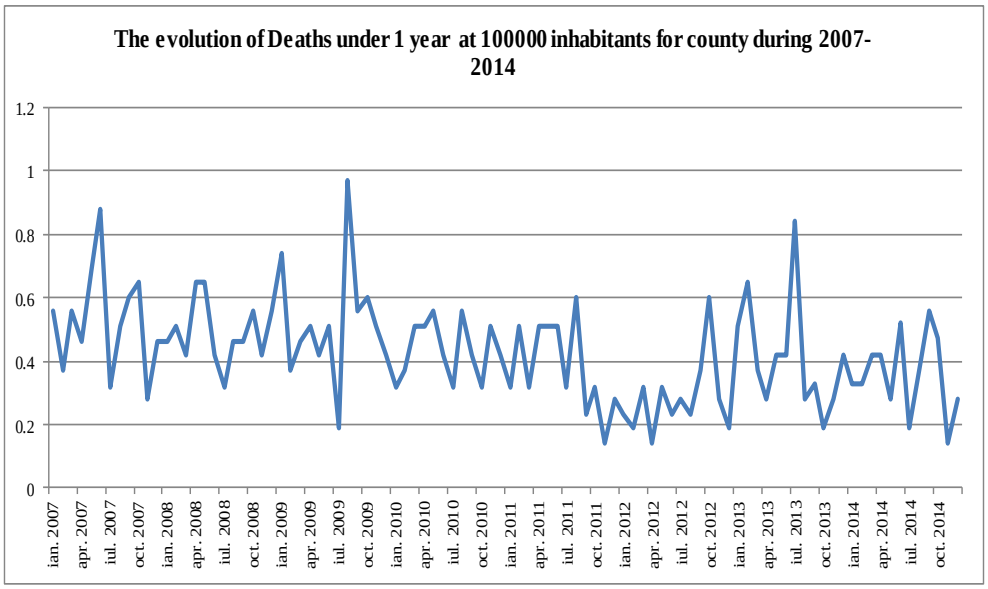


Figure 110

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.002346175x+0.540664474 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 0 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0.14,0.32,0.42,0.51,0.97). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (0,0.16) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [0,0].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is better than the national, being better in 97.92% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 60. The evolution of Bucharest County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	91897	-
2008	109187	18.81
2009	94632	-13.33
2010	97441	2.97
2011	104072	6.81

2012	100173	-3.75
2013	106224	6.04
2014	110005	3.56

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Marriages" from GDP, we find that there is a dependence of Marriages from GDP in the current year and the regression equation is: 1.0433dGDP+-6.2149. Searching dependence annual variations of "Divorces" from GDP, we find that there is a dependence of Divorces from GDP offset by 2 years and the regression equation is:-1.3628dGDP+5.6592. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is not a dependence of the variation of GDP.

2.11. Analysis of Natural Movement of Buzau County Population

Statistics of natural movement corresponding to Buzau County are the following:

Table 61. The natural movement of Buzau County population during 2007-2008

Month	Live birt	Dec eas	Nat ural	Mar riag	Div orc	Dea ths und	Month	Live birt	Dec eas	Nat ural	Mar riag	Div orc	Dea ths und
ian,07	415	625	-210	450	64	4	ian,08	395	682	-287	117	34	3
feb,07	343	505	-162	530	68	4	feb,08	341	585	-244	159	18	9
mar,07	383	532	-149	336	69	5	mar,08	373	569	-196	142	44	9
apr,07	353	593	-240	317	74	6	apr,08	365	557	-192	76	40	1
mai,07	354	513	-159	243	78	9	mai,08	366	513	-147	233	201	3
iun,07	404	477	-73	353	72	5	iun,08	383	479	-96	268	90	4
iul,07	434	544	-110	376	55	4	iul,08	482	456	26	308	33	3
aug,07	441	454	-13	440	46	9	aug,08	371	479	-108	518	111	4
sept,07	423	420	3	436	72	3	sept,08	448	483	-35	331	24	4
oct,07	402	517	-115	405	74	3	oct,08	430	538	-108	356	34	8
nov,07	402	564	-162	260	111	8	nov,08	338	495	-157	229	82	5
dec,07	370	657	-287	138	90	5	dec,08	377	614	-237	104	80	3

Source: INSSE

Table 62. The natural movement of Buzau County population during 2009-2010

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,09	382	664	-282	92	25	5	ian,10	336	657	-321	102	28	6
feb,09	362	511	-149	180	104	2	feb,10	351	559	-208	80	116	5
mar,09	353	609	-256	86	117	2	mar,10	372	646	-274	51	86	6
apr,09	314	580	-266	100	98	5	apr,10	298	551	-253	185	91	2
mai,09	371	536	-165	199	43	5	mai,10	310	519	-209	167	64	2
iun,09	361	509	-148	235	70	2	iun,10	389	519	-130	123	84	3
iul,09	443	530	-87	314	65	5	iul,10	385	533	-148	312	71	8
aug,09	425	461	-36	387	76	6	aug,10	391	544	-153	322	56	3
sept,09	420	451	-31	344	21	4	sept,10	341	451	-110	290	25	4
oct,09	383	512	-129	355	22	3	oct,10	381	589	-208	271	37	3
nov,09	339	592	-253	187	32	6	nov,10	362	557	-195	103	44	6
dec,09	334	662	-328	102	64	6	dec,10	375	603	-228	70	63	3

Source: INSSE

Table 63. The natural movement of Buzau County population during 2011-2012

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,11	319	610	-291	89	33	2	ian,12	321	618	-297	61	28	5
feb,11	297	612	-315	73	78	8	feb,12	318	690	-372	57	50	4
mar,11	326	685	-359	45	85	2	mar,12	311	616	-305	37	34	6
apr,11	266	621	-355	73	96	5	apr,12	258	554	-296	122	40	4
mai,11	337	590	-253	124	85	5	mai,12	342	509	-167	103	42	4
iun,11	321	481	-160	156	51	6	iun,12	319	521	-202	188	56	2
iul,11	351	505	-154	256	34	1	iul,12	309	511	-202	243	9	2
aug,11	379	493	-114	348	59	2	aug,12	384	471	-87	333	69	3
sept,11	332	417	-85	272	30	2	sept,12	293	418	-125	330	18	4

oct,11	338	540	-202	264	43	0	oct,12	337	499	-162	233	35	1
nov,11	302	548	-246	95	56	6	nov,12	317	561	-244	100	31	4
dec,11	289	564	-275	51	68	1	dec,12	268	602	-334	68	24	4

Source: INSSE

Table 64. The natural movement of Buzau County population during 2013-2014

Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year	Month	Live births	Deceased	Natural increase	Marriages	Divorces	Deaths under 1 year
ian,13	310	616	-306	57	10	1	ian,14	303	600	-297	73	2	3
feb,13	267	506	-239	62	64	0	feb,14	276	580	-304	77	39	1
mar,13	253	650	-397	95	63	6	mar,14	319	574	-255	51	37	2
apr,13	259	655	-396	29	53	4	apr,14	285	659	-374	76	40	4
mai,13	237	534	-297	146	45	3	mai,14	262	551	-289	141	35	3
iun,13	289	529	-240	216	37	4	iun,14	302	491	-189	164	43	5
iul,13	367	501	-134	204	59	1	iul,14	381	519	-138	259	30	7
aug,13	324	454	-130	344	43	2	aug,14	388	479	-91	396	47	3
sept,13	334	514	-180	238	29	3	sept,14	341	476	-135	263	52	2
oct,13	385	543	-158	224	36	5	oct,14	373	590	-217	257	39	3
nov,13	281	506	-225	113	29	3	nov,14	281	536	-255	120	43	3
dec,13	249	650	-401	52	47	4	dec,14	268	597	-329	53	55	3

Source: INSSE

Table 65. The population trends of Buzau County during 2007-2014

Year	Population	Year	Population
2007	504794	2011	496028
2008	502883	2012	492971
2009	500997	2013	490222
2010	498838	2014	486634

Source: INSSE

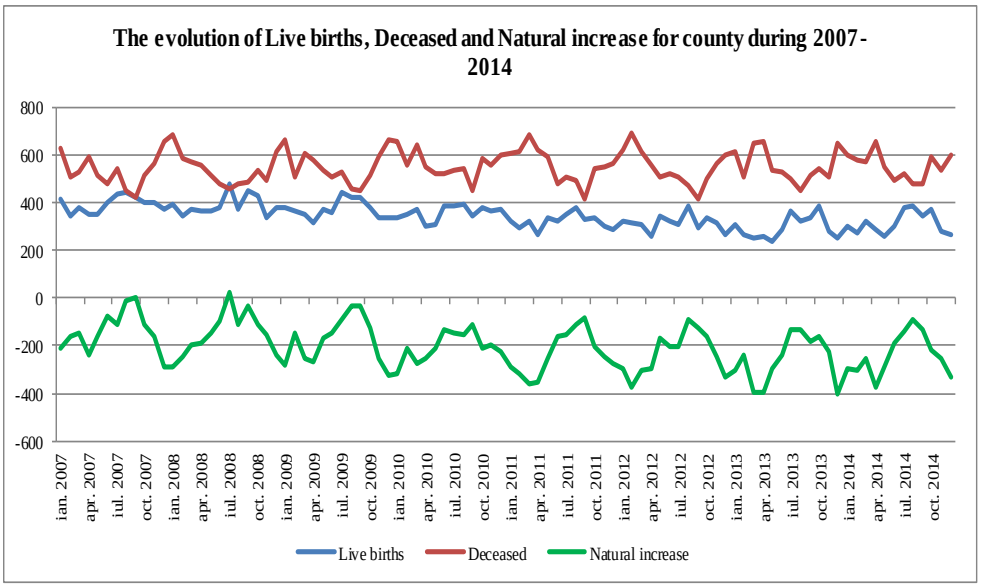


Figure 111

From figure 111 we can see a sinusoidal evolution of the indicator. Except months sept 2007, iul 2008 the natural increase was negative.

Regression analysis relative to indicator "Live births" gives us an equation: y=-1.16757325x+401.8252193 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Deceased" gives us an equation: y=0.11737656x+543.7030702 where x is the number of month (Jan, 2007=1), therefore an upward trend.

Regression analysis relative to indicator "Natural increase" gives us an equation: y=-1.28494981x+-141.8778509 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

For the set of values above, the median indicator for "Live births" is 342, for "Deceased" is 542 and for "Natural increase": -202. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births": (237,310,341.5,381.25,482), for "Deceased": (417,505.75,541.5,597.75,690) and for "Natural increase": (-401,-276.75,-202,-137.25,26).

The arithmetic mean and the standard deviation for "Live births" are: (345,51.09), for "Deceased": (549,65.2) and for "Natural increase": (-204,94.64). This means that

with a probability greather than 0.68 “Live births” are in the range [294,396], for “Deceased” in [484,614] and for “Natural increase” in [-299,-109].

Percentiles length indicators analysis (Figure 112) show that, indeed the concentration is around the middle of the data.

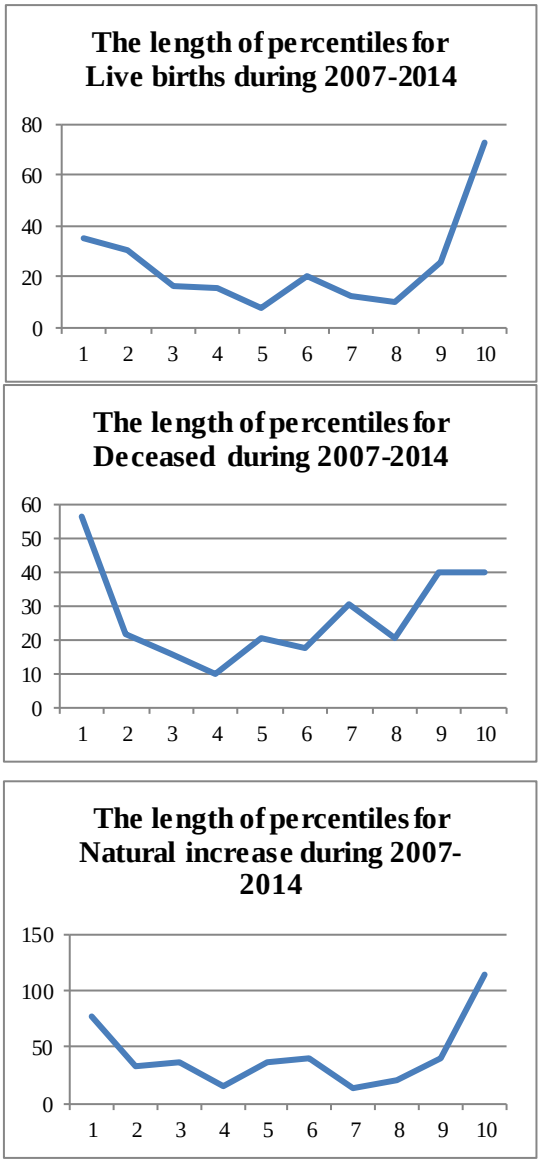


Figure 112

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Live births/10000 inh., Deceased/10000 inh. and Natural increase/10000 inh. as in the figure 113.

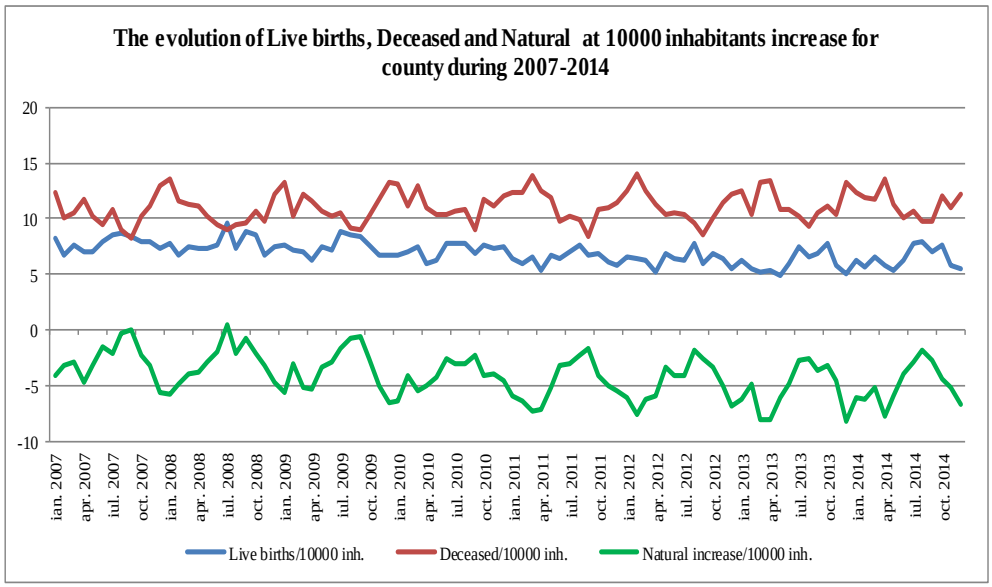


Figure 113

Regression analysis relative to indicator "Live births/10000 inh." gives us an equation: y=-0.020516481x+7.938486842 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Deceased/10000 inh." gives us an equation: y=0.007075149x+10.72164693 where x is the number of month (Jan, 2007=1), therefore an upward trend.

Regression analysis relative to indicator "Natural increase/10000 inh." gives us an equation: y=-0.027587629x+-2.783458333 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Live births/10000 inh." is 7, for "Deceased/10000 inh." is 11 and for "Natural increase/10000 inh.": -4. This means that the probability that the indicator has a value less than the median is equal to the probability that it has a higher value than this.

Also, the distribution of quartiles is for "Live births/10000 inh.": (4.83,6.27,6.89,7.64,9.58), for "Deceased/10000 inh.": (8.32,10.175,10.9,12.13,14) and for "Natural increase/10000 inh.": (-8.18,-5.5625,-4.1,-2.8225,0.52).

The arithmetic mean and the standard deviation for "Live births/10000 inh." are: (7,0.98), for "Deceased/10000 inh.": (11,1.33) and for "Natural increase/10000 inh.": (-4,1.93). This means that with a probability greather than 0.68 "Live births/10000 inh." are in the range [6,8], for "Deceased/10000 inh." in [10,12] and for "Natural increase/10000 inh." in [-6,-2]. Percentiles length indicators analysis (Figure 114) show that, indeed the concentration is around the middle of the data.

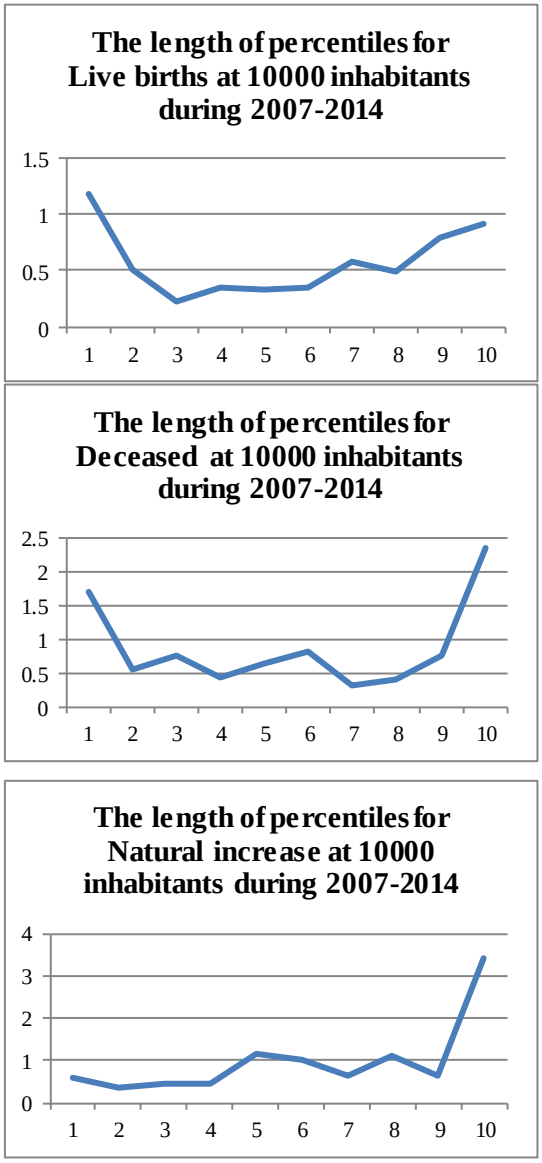


Figure 114

A comparison of the indicator "Live births" with the national level shows that it is worse than the national, being better only in 8.33% cases. For "Deceased" the indicator is worse than the national, being better only in 0% cases. Finally, for "Natural increase", the indicator is worse than the national, being better only in 1.04% cases.

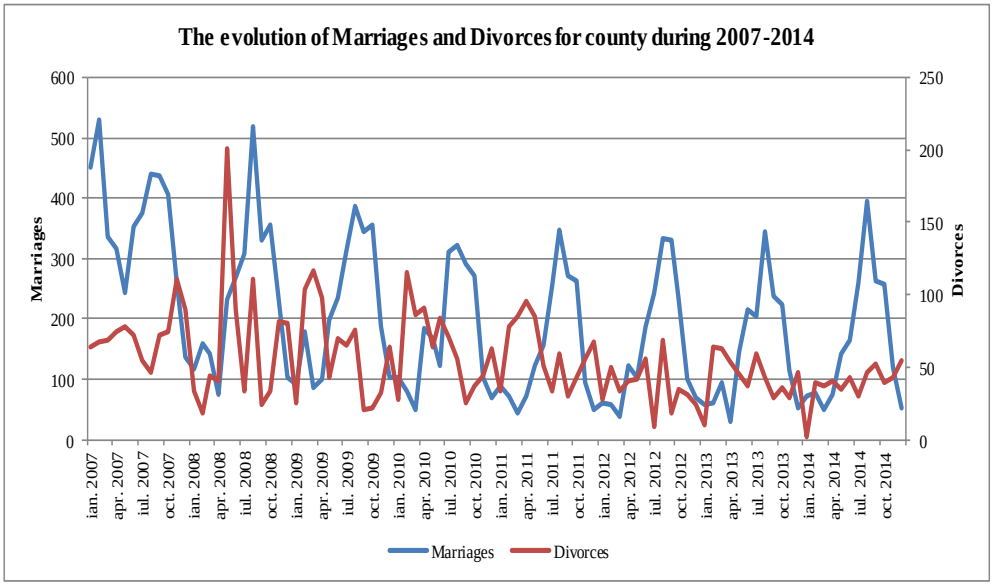


Figure 115

Regression analysis relative to indicator "Marriages" gives us an equation: y=-1.831626424x+288.9692982 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

Regression analysis relative to indicator "Divorces" gives us an equation: y=-0.432331796x+76.14517544 where x is the number of month (Jan, 2007=1), therefore a pronounced downward trend.

For the set of values above, the median indicator for "Marriages" is 183 and for "Divorces" is 49. Also, the distribution of quartiles is for "Marriages": (29,94.25,182.5,294.5,530) and for "Divorces": (2,34,48.5,71.25,201). The arithmetic mean and the standard deviation for "Marriages" are: (200,123.14) and for "Divorces": (55,29.36). This means that with a probability greather than 0.68 "Marriages" are in the range [77,323] and for "Divorces" in [26,84].

Percentiles length indicators analysis (Figure 116) show that, indeed the concentration is around the middle of the data.

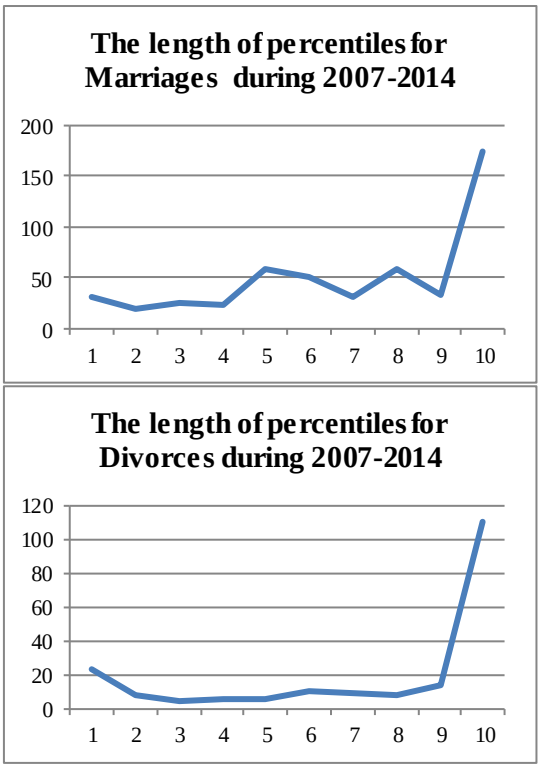


Figure 116

Taking into account the population dynamics during the analyzed period we have the following evolution of the indicators: Marriages/10000 inh. and Divorces/10000 inh. as in the figure 117.

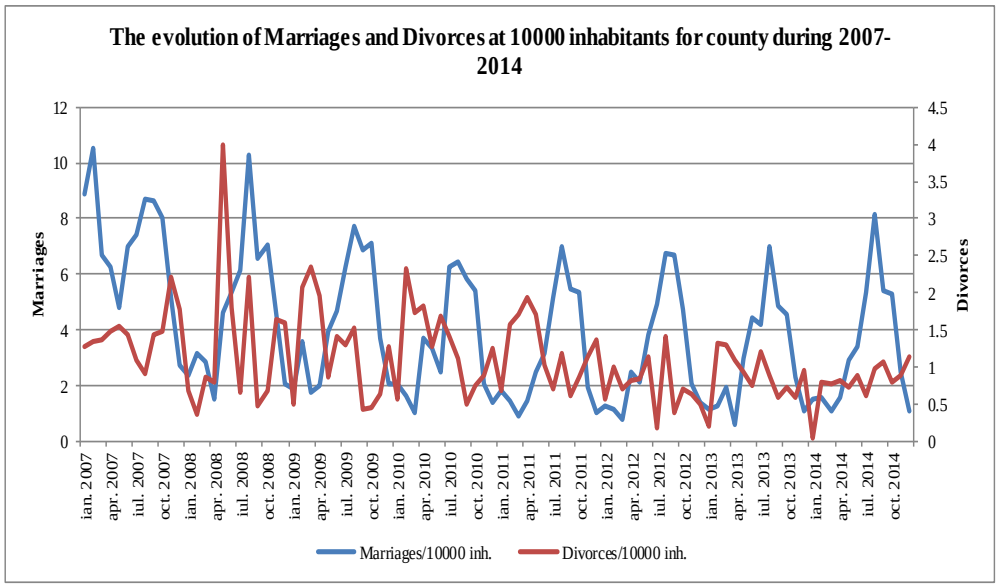


Figure 117

Regression analysis relative to indicator "Marriages/10000 inh." gives us an equation: y=-0.034931769x+5.711690789 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

Regression analysis relative to indicator "Divorces/10000 inh." gives us an equation: y=-0.008275231x+1.510098684 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Marriages/10000 inh." is 4 and for "Divorces/10000 inh." is 1. Also, the distribution of quartiles is for "Marriages/10000 inh.": (0.59,1.9,3.65,5.8875,10.5) and for "Divorces/10000 inh.": (0.04,0.69,0.99,1.4225,4). The arithmetic mean and the standard deviation for "Marriages/10000 inh." are: (4,2.45) and for "Divorces/10000 inh.": (1,0.58). This means that with a probability greather than 0.68 "Marriages/10000 inh." are in the range [2,6] and for "Divorces/10000 inh." in [0,2].

Percentiles length indicators analysis (Figure 118) show that, indeed the concentration is around the middle of the data.

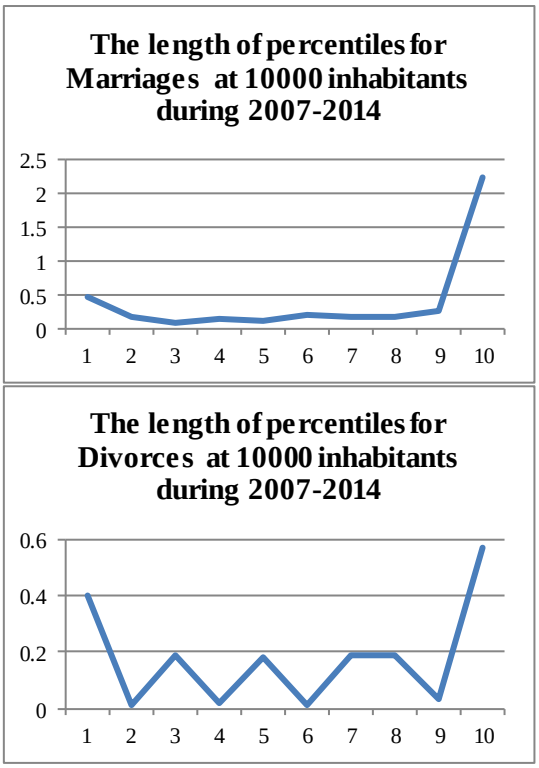


Figure 118

A comparison of the indicator "Marriages" with the national level shows that it is worse than the national, being better only in 17.71% cases. For "Divorces" the indicator is about the same with the national, being better in 58.33% cases.

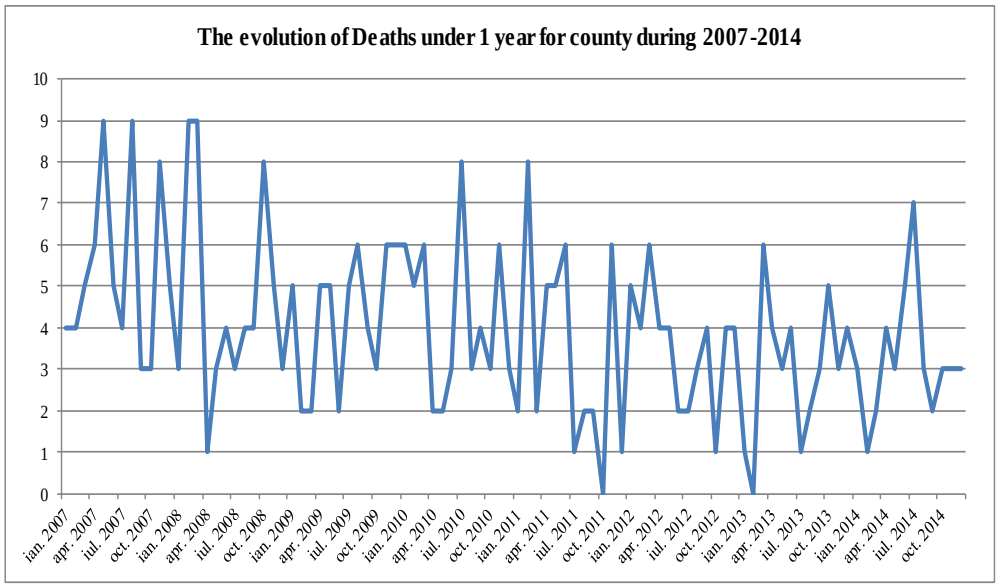


Figure 119

Regression analysis relative to indicator "Deaths under 1 year" gives us an equation: y=-0.02609197x+5.234210526 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year" is 4 and the distribution of quartiles is for "Deaths under 1 year": (0,3,4,5,9). The arithmetic mean and the standard deviation for "Deaths under 1 year" are: (4,2.05) which means that with a probability greather than 0.68 "Deaths under 1 year" are in the range [2,6]. Percentiles length indicators analysis (Figure 120) show that, indeed the concentration is around the middle of the data.

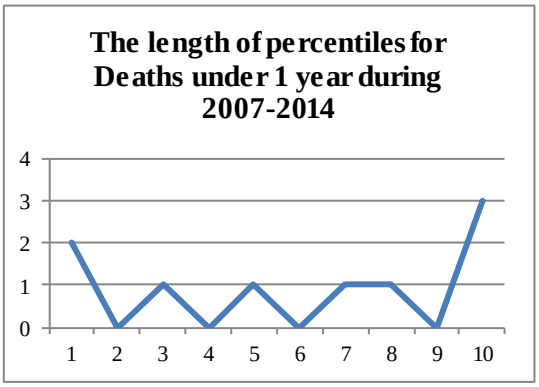


Figure 120

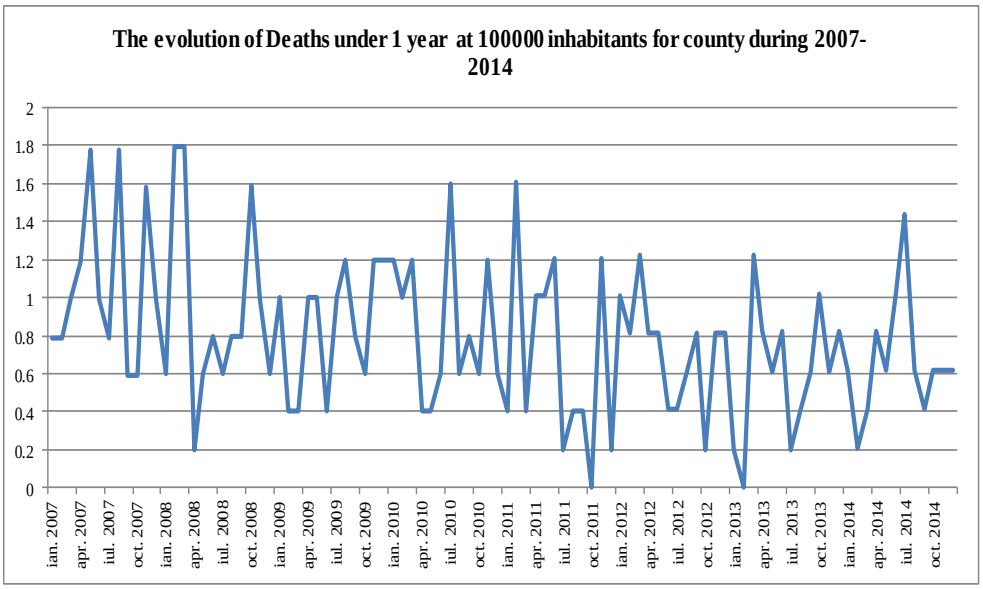


Figure 121

Regression analysis relative to indicator "Deaths under 1 year/100000 inh." gives us an equation: y=-0.004889311x+1.034631579 where x is the number of month (Jan, 2007=1), therefore a very small downward trend.

For the set of values above, the median indicator for "Deaths under 1 year/100000 inh." is 1 and the distribution of quartiles is for "Deaths under 1 year/100000 inh.": (0,0.59,0.8,1.01,1.79). The arithmetic mean and the standard deviation for "Deaths under 1 year/100000 inh." are: (1,0.41) which means that with a probability greather than 0.68 "Deaths under 1 year/100000 inh." are in the range [1,1].

A comparison of the indicator "Deaths under 1 year" with the national level shows that it is about the same with the national, being better in 43.75% cases.

A final analysis examines dependence aforementioned indicators of regional GDP variation.

Table 66. The evolution of Buzau County GDP during 2007-2014

Year	GDP (in mil. lei 2007)	Variation (%)
2007	6207	-
2008	6738	8.55
2009	6393	-5.11
2010	6150	-3.8
2011	5968	-2.97

2012	6249	4.71
2013	6643	6.31
2014	6413	-3.47

Source: INSSE and own calculations

In what follows, we shall investigate if there is a dependency between GDP variation (noted with dGDP) and the aforementioned indicators.

Searching dependence annual variations of "Live births" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deceased" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Natural increase" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Marriages" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Divorces" from GDP, we find that there is not a dependence of the variation of GDP. Searching dependence annual variations of "Deaths under 1 year" from GDP, we find that there is not a dependence of the variation of GDP.

Bibliography

Ioan, Gina & Ioan, Cătălin Angelo (2017). *Macroeconomics*. Galati: Zigotto Publishers.

Ioan, Cătălin Angelo (2011). *Mathematics*. Galati: Zigotto Publishers.

Voineagu, Vergil; Mitrut, Constantin & Isaic-Maniu, Alexandru (2003). *Statistics.* Bucharest: Universitara Publishers.