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Divorces and marriages: important influential factors for the new borne rate

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Abstract: *The population of Romania is getting older, both because of the rise of life expectancy and because of the lowering of the new borne rate. We wanted to find new correlations between demographical indicators, in order to bring to light possibilities to grow new borne rate in Romania.*

Keywords*: demographical rates, divorces, marriages, new borne rate*

1 Introduction

The lowering of birth rate and the ageing of population are lately the general tendencies in the whole Europe. After 2006, when old population over numbered young population (16.8% versus 16%) for the first time in history (Population reference bureau 2006), it is estimated that in 2060, 30% of the Europeans will be over 65 (Giannakouris 2008).

In a joined meeting (2007) of Eurostat (Statistical Office of the European Communities) and the UNECE (United Nations Economic commission for Europe), regarding demographical projects, it was underlined that the phenomenon of ageing of population is present everywhere in the world. In Europe, the problem is even worse, taking in account that the proportion of persons over 60 is greater than in other regions and twice higher than the world average.

Regarding Romania, the weight of seniors raised from 10.3% in 1990, to 14.9% in 2007, while the weight of persons under 14 years mitigated from 23.7% in 1990, to 15.4% in 2007. In future, elements like lowering of birth rate and rise of mortality will lead to a diminution of the Romanian population at about 19-20 de millions until 2025 (2.4).

Some estimations show that the number of Romanians could diminish with 21%, until 16.92 millions, in 2060, which represents one of the most accentuated reductions from EU, similar to Bulgaria, Latvia, Lithuania and Poland (Giannakouris 2008). If until 2060 Romania will reach the above number of inhabitants, we could stay on the fourth place in the hierarchy of countries with the lowest negative population growth. The degree of dependence of seniors, calculated by relating the number of persons

over 65, with the number of active persons, will grow in Romania from 21.3%, (now) to 65.3% in 2060, It will be a huge burden for the national economy in general, and for the insurance and health systems, in particular. All having in background the fact that in the European Union the life expectancy is rising, so in Romania the older population(>65 years) will grow from 14.9% of the entire population in 2008, to 35 %, in 2060 (Giannakouris 2008)

Between 2008 and 2035, the Union population is expected to rise with 5.1%, from 495 millions, to 521 millions. Unfortunately, until 2060 the tendency will reverse, and the population will lower to 506 millions. After 2015, the mortality rate in EU will surpass the birth rate, and immigration will be the one and only element to cause the growth of population (Population projections 2008).

We can notice that in April 2007, the new borne rate in Romania was 8.6 ‰, with 1.1‰ less that in the similar period of the previous year (Romanian National Institute of Statistics 2008). During that month, there have been registered 15,249 new borne, fewer with 2,100, if compared with March 2007 and with 1,935, if compared to April 2006 (Romanian National Institute of Statistics 2008).

The negative natural growth, reflecting a deficit of live births in relation with those deceased, grew in 2008 at -5.7 thousand persons, compared with the figures from march 2007 (-4.6 thousand) and from April 2006 (-4.5 thousand) (Romanian National Institute of Statistics 2008).

The tendencies expressed by these figures are upsetting and need the onset of efficient social, political and economical measures oriented towards couples supporting and pregnancy encouragement. In a few years we can be confronted with an old and majoritary dependent population, incapable to support a rise of the Romanian economy but very costly for the health care system.

In our research, we wanted to find new ways to examine the problems linked to natural dynamics of population, ways that could allow us to bring to light new correlations between specific parameters. The main target was to search for elements influencing new borne rate, in order to allow in future the onset of specific measures to encourage population growth and rejuvenation. The essential part of this article was also presented at the 12 th World Congress on Public Health in 2009, Istanbul, Turkey under the title „New demographical pathways arise of the natural increase rate".

2 Methods

Conventionally, the population dynamics includes not only birth and death rate, but also marriages and divorces, taking in account their influence on the existence and functioning of family. We selected rates of population dynamics regarding the 1930-2004 period (Anuarul Statistic al Romaniei 1930, 1990-2005; Serbu 1962; Trebici 1986; Anuarul Statistic al RPR 1957-1970, 1980, 1985). We took in account the years in which there have been taken express legislative measures (and precedent and successive years), measures influencing directly the sexual-reproductive, economical, moral and pedagogical-educative functions of family. In 1989, in Romania the political regime changed, from communism, to capitalism. So we considered in our study all the 15 years after 1989, due to the huge political and legislative changes with direct impact on the attitude and behavioural patterns of the Romanian population (Muresan et al. 2008).

We used statistical methods to process data regarding Romanian population dynamics : correlation, linear regression analysis (Lomax 2001, Everitt 2001), analysis of variance (ANOVA) (Cardinal et al. 2005; Miller 1997), asymptotic (de Bruin 1981) and bootstrap (Varian 2005; Aksenov 2008) methods, by means of the SPSS software.

3 Results

We have statistically analyzed the following variables: live births, deceased, natural growth, marriages, divorces, sill borne, deceased in the first year of life and we searched the in-between correlations. In Table 1 we present Pearson correlations between the above variables.

We can see that:

1. Live births rate is positively significant correlated ($p<0.01$) with the rates of: still births, deceases under 1 year/1000 live births, marriages and is negatively correlated ($p<0.01$) with divorces rate.

2. Deceases rate is significant correlated ($p<0.05$) with deceases under 1 year/1000 live births rate.

3. The natural growth is significant positively correlated($p<0.01$) with the following rates: live births, still births, deceases under 1 year/1000 live births, marriages and significant negatively correlated ($p<0.01$) with divorces rate.

4. Surprisingly, the natural growth does not correlate with deceases' rate, as probably expected, but with marriages and birth rate.

5. Marriages rate is significant correlated ($p<0.01$) with the following rates: still births, deceases under 1 year /1000 live births, natural growth and live births.

6. Divorces rate is negatively significant correlated ($p<0.01$) with live births rate and natural growth and, at a $p<0.05$, with the rates of still births rate and deceased under 1 year/1000 live births rate – findings also sustained by other national and international studies (Myers 1996; Arieke et al. 2009).

7. The still borne rate is significant correlated ($p<0.01$) with live births rate, with natural growth, deceased under 1 year, marriages and, at a $p<0.05$, negatively correlated with divorces rate.

The significant correlations showed above, indicate that the natural dynamics model could be explained by the interdependence of different factors and hence we tried to build a linear regression model.

Thus, considering the dependent variable the live birth rate and as independent variables, marriages and divorces, we constructed the following linear regression equation:

$$NN = C + B_1 \, x \, marriages - B_2 \, x \, divorces$$

Where NN = live birth rate

C= the model constant = 4.714

B_1. B_2, the coefficients ($B_1 = 3.049$; $B_2 = 9.061$)

We now present the results of the linear regression analysis, done with the SPSS program. From Table 2, we see that R and R square values are close to the maximal value, 1, thus showing the validity and the fidelity of the model (the correctness of the explanations obtained by using it).

Practically, 87% of the variability of the dependent variable (number of new borne) can be explained by the variability of the dependent variables (divorces, marriages). The model is significant different ($p<0.01$) if compared with the null model (null hypothesis), in which there are no relations between the dependent variable and the independent variables (explicative).

ANOVA test (Table 3) shows the correctness of the model, because the independent variables can explain the dependent variable variations.

In Table 4, there are the values of linear regression coefficients and the degree of significance of each one. Thus, the coefficients of independent variables [B_1, B_2] (marriages, divorces) are significant different compared to zero. The model constant [C] is at the limit of the significance threshold.

The collinearity test, through the two statistical coefficients, the tolerance coefficient and the VIF coefficient, don't rise problems of multicollinearity in the model, which eventually could affect the determinate values of the coefficients of the linear model.

The equation shows that:

1.Marriages rate has a positive influence over new borne rate

2.Divorces rate has a negative influence over new borne rate, being 3 times stronger than marriages rate. Moreover, we can say that a divorce lowers with „9" the new borne rate, compared with a marriage, boosting only with "3" the rate of new borne.

We wanted to validate the model by bootstrap method. The only problem of the model seemed to be the constant, which is not statistically significant different from zero, having $p=0.075 > 0.05$. That's why we also used the method of estimation of the regression coefficients by bootstrap method, available in SPSS for non-linear models. We forcedly imposed to SPSS program to analyze 999 samples extracted by bootstrap. The results are presented in Table 5.

The estimate of coefficients by bootstrap is not modifying the values of B_1, B_2 and C parameters, in relation with the classic model (asymptotic). This fact indicates that the value of model's constant is significant different compared to zero, because its estimated value of 4,714 is present in the 95% confidence interval (0.748 – 8.641), who hasn't zero value included into it. So, we have another reason to consider the model as valid.

3 Discussions

The worsening of the figures regarding new borne and deceases rates made Romania confront with a population decline. It was estimated that between 1990 and 2008 we have a deficit of 1,7 million inhabitants. Moreover, in the first months of 2008, over 22.500 divorces have been registered. The National Statistics Institute shows that the growth of divorce rate is not a specific problem of our country, in Europe one of two marriages end at the courthouse. Last year, over 32,600 married couples split in Romania and the divorce rate was 1.51/1000 inhabitants in Romania (Romanian National Institute of Statistics 2008). The Romanian Government intends, by means of a memorandum, to elaborate a demographical strategy for Romania and a plan of measures aiming to prevent the lowering of the Romanian population throughout the years to come (2008-2009-2050). In this prospect, our study underlines the necessity of social and economical measures to encourage marriages, to rise the stability of couples and to avoid divorces, because of the positive influence exercised by marriages rate on birth rate. It is wishful to create positive conditions for child growth and caring and to promote the reconciliation of family life with professional life, as premises of revigorating birth rate at local and continental level. Not only should we get people married, bet we also have to give them good reasons to stay like that!

4 Key points:

1. Demographical dynamics rates are closely correlated and their analysis can bring to light ways to influence the demographical problems to which Romania and the entire Europe are and will be confronted;

2. Marriages and divorces rates have a big influence on new born rate, with divorces having a stronger negative influence, than marriages a positive one;

3. There is a huge necessity for social and economical measures to encourage marriages, to rise the stability of couples and to avoid divorces.

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TABLE LEGENDS:
Table 1 – Pearson correlation between variables of the natural dynamics of population

		Live births	**Deceases**	**Natural growth**	**Marriages**	**Divorces**	**Still births /1000 live+still births**	**Deceases under 1 year/1000 live births**
Live births	Pearson	1	0.210	0.939**	0.656**	-0.597**	0.854**	0.844**
	Level of significance	-	0.258	0 .000	0.000	0 .000	0.000	0.000
	N	31	31	31	31	30	31	30
Deceases	Pearson	0.210	1	-0.140	-0.057	-0.345	0.125	0.366*
	Level of significance	0.258		0.452	0.760	0.062	0.504	0.047
	N	31	31	31	31	30	31	30
Natural growth	Pearson	0.939**	-0.140	1	0.685**	-0.490**	0.821**	0.721**
	Level of significance	0.000	0.452		0.000	0.006	0.000	0 .000
	N	31	31	31	31	30	31	30
Marriages	Pearson	0.656**	-0.057	0.685**	1	0.067	0.773**	0.732**
	Level of significance	0.000	0.760	0 .000		0.724	0.000	0.000
	N	31	31	31	31	30	31	30
Divorces	Pearson	-0.597**	-0.345	-0.490**	0.067	1	-0.408*	-0.369*
	Level of significance	0.000	0.062	0 .006	0.724		0.025	0.049
	N	30	30	30	30	30	30	29
Still borne	Pearson	0.854**	0.125	0.821**	0.773**	-0.408*	1	0.794**
	Level of significance	0 .000	0.504	0 .000	0 .000	0 .025		0.000
	N	31	31	31	31	30	31	30
Deceases under 1 year/1000 new borne	Pearson	0.844**	0.366*	0.721**	0.732**	-0.369*	0.794**	1
	Level of significance	0.000	0.047	0.000	0 .000	0 .049	0 .000	
	N	30	30	30	30	29	30	30

**Significant at level 0.01
*Significant at level 0.05

Table 2 – Summary presentation of the model

Model	R	R Square	Adjusted R Square	Standard error of estimation	Statistics modifications					Durbin-Watson
					R Square modification	Modification of F	Degrees of freedom	Degrees of freedom	Level of signification Modification of F	
1	0.935	0.874	0.864	2.43865	0.874	93.389	2	27	0.000	1.319

* Predictive variables :divorces, marriages
* Dependent variable: new borne

Table 3 – ANOVA test

Model	Square sums	Freedom degrees	Square average	F	Level of significance
Regression	1110.772	2	555.386	93.389	0.000
Residuals(difference between predicted ant effective)	160.569	27	5.947		
Total	1271.342	29			

Table 4 – Equation coefficients and collinearity test

Model	Nonstandardized coefficients		Standardized coefficients	Statistical t	Level of significance	95% Confidence interval for B		Colinearity statistics	
	B	Standard error	Beta			Lower limit	Upper limit	Tolerance	VIF
Constant	4,714	2,546		1,852	0,075		9,938		
Marriages	3,049	0,290	0,721	10,519	0,000	2,454	3,643	0,995	1,005
Divorces	-9,061	0,963	-0,645	-0,9,412	0,000	-11,036	-7,086	0,995	1,005

Table 5 – Estimating the parameters by asymptotic and bootstrap methods.

Parameter	Estimate	Standard error	95% Confidence interval		95% Trimmed interval	
			Lower limit	Upper limit	Lower limit	Upper limit
asymptotic method constants	4,714	2,546	-0,510	9,938		
B_1	3,049	0,290	2,454	3,643		
B_2	-9,061	0,963	-11,036	-7,086		
bootstrap method constants	4,714	2,021	0,748	8,681	0,888	8,864
B_1	3,049	,265	2,528	3,570	2,406	3,455
B_2	-9,061	1,235	-11,485	-6,637	-10,751	-6,288