Risks and Consequences of Demographic Changes in Romania

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During the last decades we have experienced serious demographic changes observed in the decrease in both fertility and mortality and that led to the ageing of population. Despite the decrease in mortality is a good thing, the ageing make the current social security models ineffective on long term and therefore unsustainable.
The demographic forecasts are pessimistic stating that the median age of population will change from 35 years to 53 years, making an unsustainable amount of people become socially assisted. Official forecasts state that the deficits necessary to sustain such a social assistance will lead Romania into a dreadful 633% public debt versus GDP.
This working paper tries to find answers to questions like: What is the risk of continuing the current deficit model and how can we quantify them; What are the long term effects of the short term decisions leading to demographic changes; What are Romania's choices for future decisions with respect to the analyzed risks and what can each decision lead to.
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The XXth century had brought the world, besides an accelerated development, the population ageing phenomenon. This tendency is mainly caused by the growth in the life expectancy, due to medical improve-

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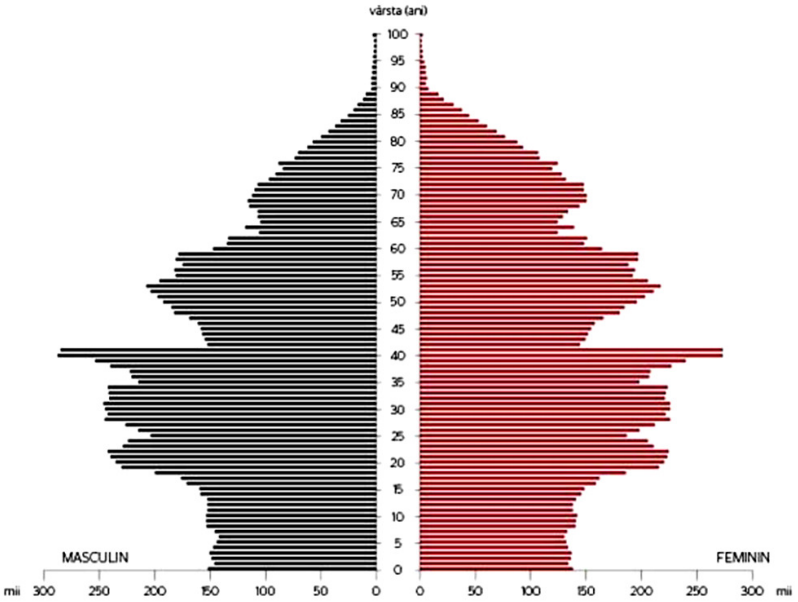
ments, but also by the significant decrease in fertility, due to a higher age at marriage and a bigger mother's age at first birth.

Despite ageing can be considered a social issue, it can be treated from an economic point of view, both when it comes to the reasons behind it and its medium and long term effects over economic systems like pension plans or economic theories like economic growth. The PAYG public pension programs are suffering as less working people are contributing to pay the elders' pensions while the economic growth theories can see their results in danger as the aggregate supply lowers due to less workers while the aggregate demand focuses on different kind of products due to elder targets.

This working paper addresses some of the most important causes of population ageing and the effects it has on the future labor market. The paper also tries to address the changes needed to compensate this destructive phenomenon, at a both national and global level.

The population distribution on age and gender shows us how big Romania's problem is: younger population doesn't amount as much as half of the older one, despite it should be higher in order to maintain the exact amount of inhabitants, considering the mortality. Basically, figure 1. below, should have a base that is larger than the middle. In a country with a fertility that sustains the current level of population, the graphic that is usually called "the population pyramid" is an equilateral triangle with the base in the lower part. The fertility of such a country is larger than 2 (more than 2 children per each woman) so that despite the mortality at all ages, the next generation could be as large as the previous.

Figure 1. Population distribution on age and gender at July 1st 2007



Source: based on INSSE – 2008 Yearbook – Chapter 2 Population.

As we can see in the graphic above, in 2008, the number of children aged 0-5 was around 43% less than the active persons in the 35-40 age group, that is considered to be the population peak. We can also see that during the history there have been a number of fertility adjustments, but none of them was 43% of the peak, nor was lasting so long. We can see that the entire 0-20 years old generation contains age groups that are 30% to 50% lower than the peak. Furthermore on the stability of the population, we can see that the young female population is slightly smaller than the male one, leading to a need of more than 2 children per woman to maintain the actual number of citizens.

Considering this population distribution, the forecasts for Romania varies on a downtrend from 22 million inhabitants now to between 16

million in 2050 according to UN studies[1] and 13 million according to more pessimistic economists. Furthermore worrying is the forecast of the age groups distribution: the median age might be raised 18 years[2], from 35 in the present time to approximately 53 in 2050. This makes PAYG[3] pension plans totally unsustainable on the long run and requires the extent of the working life to levels that might create social instability.

According to the European Commission forecasts, in "Poland and Romania, the projections point to a situation in which by 2060, there will be as many or even more inactive old persons than people working"[4]. Keeping the other conditions ceteris paribus, same social security programs and pension plans as they are now, and keeping the actual population trends when it comes to mortality as life expectancy should increase in Romania with 10 years for men and around 7 years for women to match the European values, due to the population ageing, keeping a sustainable economic growth rate, Romania's public debt would degenerate from the estimate of 22.7% in 2010 to a staggering 633.8% in 2060[5].

As we have seen above, the forecasts about the future should worry us. Yet, in order to understand why this is happening and find solutions for the future, we need to understand what leads to the population ageing.

The negative reason of population ageing is the growth of the age at first birth for many women in Romania and in the developed coun-

[1] UN fund for population - http://populatiaromanieiincotro.unfpa.ro/demografic/piramidapopulatiei/?limba=Ro
[2] Idem
[3] PAYG represents the current public pension system of Romania and many other developed countries being an acronym for Pay As You Go. This pension system relies on social security taxes paid by the current workers to pay the pensions to the elders.
[4] Bogaert Henri et. al., *2009 Population Ageing Report - Economic and budgetary projections for the EU-27 Member States (2008-2060)* – European Communities, 2009
[5] * European Commission, *Sustainability Report 2009- European Economy 9|2009, Luxemburg*, Office for Official Publications of the European Communities, 2009

tries. Many of the usual forecasting models of fertility[1] use as an exogenous variable the number of women close to the average age at first birth to forecast the number of children born during one year.

The raise in age at first birth leads to a smaller number of children every year and to a lower total fertility[2] due to a shorter use of the fertile life period. The reason of first birth age growth is determined by the family lifecycle. In this lifecycle, children are usually born in the first couple of years after marriage as they represent one of the main reasons for a family to be formed. Considering that the average age at first marriage has also increased, we can see the correlation between the two.

The high costs of time in these times, when both males and females are working side by side, are the main reasons for increasing the age at first marriage. It is considered[3] that a person searches for a more suitable partner than the existing potential one as long as the total cost differential of search is lower than the expected benefit differential. We are working in imperfect information conditions as a person cannot prior know the cost of search of the benefits of a better marriage with a yet unknown person versus the ones of a marriage to a less appropriate person that is already available.

[1] Sora, V. et. al., *Analiza statistico-demografică. Teorie şi aplicaţii*, Editura Economică, Bucureşti, 2003

[2] Fertility is usually expressed as the average number of children that a woman gives birth during her entire life. The advantage of this indicator is that it can be easily compared with 2, the minimum level in order to maintain the same population or with 2.1-2.2 considering the mortality rate at birth. The disadvantage of this indicator is that real information should only be found at the end of a person's lifetime, thus the previous information appears to be biased. Thus the calculus of this indicator has been simplified: the total female population is split on age intervals, for each interval the number of women that give birth during that year is taken into consideration and the number of children (twins, triplets etc.); the number of children per each age interval is divided to the number of women per that interval resulting a percent; the percents are then summed taking into account the number of women in that age group to offer a general image of the average number of children of a woman.

[3] G.S. Becker, *A Theory of Marriage Part II,* The Journal of Political Economy, Volume 82, Issue 2, part 2, Apr 1974, http://www.jstor.org/stable/pdfplus/1829987.pdf

To consider this cost of search, models of the couple creation were made in which "the agents are searching inside a limited number of partners, the one that maximizes the couple's output. In each time-frame the agents are paying an explicit cost of the search while they are randomly choosing their potential partner" [1]. These models show us that a person whose time is expensive will rather delay the moment of marriage to improve the quality of information about the partner and the match with that partner. If we consider time as a limited resource with a growing value due to the investments in human capital, the amount of time spent by a person to minimize the informational imperfections will be perceived as a substitute of time to work. Thus, we have a large number of unmarried individuals that will delay furthermore the moment of child birth.

Both marriage and fertility are human decisions for which economists consider that are made for maximizing the personal and family utility. The utility function can be static or dynastic. A utility function that converts the utility of children into utility of parents, depending on the altruism of each generation towards the next one, over an undetermined period of time is called a dynastic utility function[2]. Such a utility function implies that each generation is altruistic towards the next. G.S. Becker concludes that "if each child is altruistic towards both his own children and his parents, we can say that the dynastic utility function will depend both on his consumption and the fertility and consumption of all predecessors and descendants"[3].

[1] Atakan Alp E., *Assortative Matching with Explicit Search Costs*, Econometrica, Vol. 74, No. 3 (May, 2006), http://www.jstor.org/stable/4123098 , p. 667

[2] At Becker Gary S. and Barro Robert J., the family utility function is considered to be a separable function that depends on the own consumption, the number of children and the utility of each child. The utility function can be composed of more functions (preferably additively), to obtain the final utility function. In case of the dynastic utility function, all generations' utility is composed into one single function in case the altruism persists over time.

[3] Becker Gary S., Barro Robert J., *A Reformulation of the Economic Theory of Fertility*, The Quarterly Journal of Economics Volume CII Issue 1 (February 1988), http://www.jstor.org/stable/1882640, p. 5

The results of a study based on the dynastic utility shows that "the steady state population rate of growth is positively correlated with the degree of altruism towards the children and with the long term interest rate and is negatively correlated with the rate of per capita consumption growth between generations. Most of the technological progress is improving the per capita consumption growth rate"[1].

In other words, the decrease in interest rates over the last decades, have further decreased the fertility while the economic development has decreased the same indicator due to the increase in own consumption and the decrease of altruism versus the children. The effect of a decrease in a period of time gets multiplied over the next periods of time as there are fewer women in a generation to give birth to children of the next generation.

The decrease in mortality and the increase of fertility over one first period leads to a decrease of fertility over the next period. The reason is that the amount of surviving children necessary to maximize the utility function is lowering as the infant deaths are fewer. This is the mechanism by which G.S.Becker and R.Barro[2] explain why usually, before it severely decreases, the fertility has short period increases[3].

Nowadays, the medical developments have lead to a mortality decrease at all ages and an improvement in the life expectancy. This determines both a lower young generation and an increase in the elder generations.

In case we shall use a static model of fertility, an important observation is the negative correlation between fertility and the income per capita or human capital indicators like the level of schooling[4]. The explanation of this negative correlation is between the country level of

[1] Ibidem, p. 499
[2] Idem
[3] This empirical observation is quoted by G.S. Becker from the Dyson and Murphy, *The Onset of Fertility Transmission* study.
[4] Rosenzweig Mark, *Population Growth and Human Capital Investments: Theory and Evidenc*e, The Journal of Political Economy vol. 98 no 5 part 2 1990

development and fertility relies, according to the study, on the effects that technology has over human capital generated revenues. A higher demand of human capital investments, due to the large amount of human capital of the competitors on the labor market, determines the parents to decide on a lower number of children so that they could make the necessary human capital investments. The results of the model shows us that "the decrease in human capital turnover and associated with technological exogenous developments lead simultaneously to increases in schooling investments and significant decreases of fertility" [1].

Observing the social modifications that Romania is passing through, the sociologist L.Vlasceanu considers that "a major contradiction between the traditional family formation and the emerging social structure is tormenting the internal order of the contemporary societies, in the form of an opposition between men and women that is reflected both in the private sphere of the family and in the public one of the social and economic life configuration by the following: the divorce rate is growing, the fertility is decreasing, the family violence is not stopping, the number of mono-parental families is raising etc." [2].

Considering that children are perceived as one of the main benefits of the family, the current insecurity leads to a higher risk of the investments in children. Thus the number of children is decreasing as their transaction costs in case of a divorce are high.

Another potential reason for the decrease of fertility is the increase in incomes and the lower gender differences in revenues. For the United States of America for instance, studies like Butz and Ward's estimate fertility elasticity over women salaries between -1.59 and -1.54 while the same elasticity over men salaries is between 1.307 and 1.308.[3] The

[1] Ibidem, p.S42
[2] Lazăr Vlăsceanu, *Sociologie şi modernitate; Tranziţii spre modernitatea reflexivă*, Editura Polirom, Bucureşti, 2007, p. 189
[3] Butz W.P., Ward M.P. *The Emergence of Countercyclical US Fertility* American Economic Review, vol. 69, 1979, http://www.jstor.org/stable/pdfplus/1807367.pdf, p. 321

increase in women salaries leads to less time in the household sector and child care and thus a lower number of children.

In conclusion, the population ageing process is due to the decrease in mortality on all age intervals, caused on one hand by medical developments and on the other hand to the decrease of fertility. The fertility decrease is caused by the constant increase of age at marriage, the increase in consumption, the increase in women salaries and human capital available on the labor market, and on the decrease of long term interest rates and gender salary differences, together with many other factors.

The future impact of population ageing will lead to an increase in the dependence report to around 5/1 – 5 person requiring aid to 1 active person – which will be very difficult to accept and sustain at a social level. Thus, considering the population evolution according to the current trends, in 50 years an active person might have to support up to 5 assisted individuals, putting more negative pressure on economic growth and on PAYG social security and retirement programs.

The measures that need to be taken not to get to a social security system that is unsustainable on the long run that would lead to a severe increase in retirement age, closer to the life expectancy levels and a decrease in human capital levels, correlated with a lower age at first job would be:

- A rapid increase in fertility by encouraging marriages and child births even outside the marriage, with the risk of lower human capital investments;
- External investments in developing countries with a high potential for the future, that could sustain the future social security programs despite the labor deficit in Romania;

- Encouraging the labor migration from less developed countries that still have demographic growth to ensure the labor force necessary for the future.

While the first two solutions are appropriate to more developed countries and quite impossible for Romania, the last one has quite some potential, both here and in other countries, in the context of a global labor market. Yet, a mix of the three strategies would be appropriate to secure a majority of Romanian population in Romania over the centuries to come.

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