

ANALYSIS OF FERTILITY IN TEN CENTRAL AND EASTERN EUROPEAN COUNTRIES AFTER 1989

Dănuț-Vasile JEMNA
Elena CIGU

Abstract

The establishment of democracy in the communist countries, which generated profound social and economic transformation, was accompanied by a decline in fertility. We attempt to provide an overall survey on fertility since 1989 in ten Central and Eastern European Countries, members of the European Union, and to identify the variables which explain the fertility decline. We will use univariate and multivariate statistical analysis to identify disparities between the ten countries, and the variables which explain these differences. Also, we developed a panel econometric model to confirm the hypothesis of a similar pattern of evolution for fertility in these countries and that the decline in fertility can be explained both through demographic and economic variables. The decline in fertility can be explained by economic growth, marriage, divorce, abortion, and migration. The empirical evidence presented in this paper supports the view that the decline in fertility over the 1980s represents the continuation of a longstanding trend of the previous period, according to the demographic transition theory, but its speed and magnitude has been influenced by the new social and economic landscape. These results can be useful for public authorities of the CEE countries to rethinking demographic policies and to ensure the sustainability of demographic growth.

Keywords: fertility, demographic transition, Central and Eastern European countries, economic and social transition.

Dănuț-Vasile JEMNA

Associate Professor, Department of Accounting, Informatics Economics and Statistics, Faculty of Economics and Business Administration, Alexandru Ioan Cuza University, Iași, Romania
Tel.: 0040-232-201.410
E-mail: danut.jemna@uaic.ro

Elena CIGU

Lecturer, Department of Finance, Money and Public Administration, Faculty of Economics and Business Administration, Alexandru Ioan Cuza University, Iași, Romania
Tel.: 0040-232-201.569
E-mail: elena.chelaru@uaic.ro

1. Introduction

The change of regimes in Central and Eastern Europe (CEE) after 1989, which was succeeded by a political, social and economic transition process, has been accompanied by important demographic changes. The main question is if these demographic transformations are strongly influenced by transition or represent normal changes, which continue the past tendencies of demographic phenomena. A certainty is that CEE countries have experienced a decline in fertility after 1989, but this fall was already underway since the last decades of the past communist period. Long-term trends of decline in fertility finally lead to a relative stabilization of the phenomena starting with the second decade of the '90s. This result is predicted by the theory of demographic transition, which was developed in relation to demographic changes in Western European countries. The transformations after 1989 in the CEE countries have facilitated the demographic evolutions of this area in accord with the model proposed by this theory, but with specific elements of this transition period and of these ex-communist countries.

The existence of a common pattern of demographic evolution for CEE countries was advanced by recent studies (Rodin, 2011, pp. 221-230). At the same time, we believe that there are significant differences within the European area (Billingsley, 2010, pp. 193-231), especially between countries that joined the EU and other countries. In this research paper an analysis of the evolution of fertility in a limited group of countries in the CEE region is proposed, namely in ten EU states: Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia, and Hungary. The main objective of this paper is to quantitatively explain the evolution of fertility in these 10 countries using the univariate and multivariate statistical analysis and the econometric modeling based on official statistical data from the period 1989-2010. Identifying similarities and differences, and the existence of some demographic transition highlights, which are specific to the EU area, in CEE countries are important research objectives. This can help in explaining the phenomenon through an analysis that includes the experience of these countries with similar backgrounds and similar features.

The basic hypothesis in this paper is that post-communist demographic changes for these ten countries comply with a common pattern and that after 1989 there are no spectacular demographic transformations, but we are dealing with a continuation and a stabilization of the trends of the previous period, trends that some studies have ignored (Cornia and Paniccià, 1996; Ranjan, 1999, pp. 25-43). The decline in fertility in the ten CEE countries can be explained by the demographic transition theory and the new social and economic conditions in this region after the fall of the communism. According to the theory of demographic transition, shortly after 1989, demographic trends in CEE countries tend to stabilize their evolution. In the case of fertility, the decreasing trends reach weak fluctuations around small values, below the replacement rate, with an average of 1.44 children per woman, between 1989 and 2010 (Eurostat, 2012). This situation must be correlated both with the high inertia of demographic phenomena in time, and with the specific conditions of the socio-economic transition.

The long-term trend of the demographic decline combined with the socio-economic specific of the transition process in CEE countries, bring into question the importance of development policies on medium and long term, and within them the place and role that the demographic situation plays for the future of these countries. For public institutions, at the central level, but also for local governments is essential to identify the determinant factors having an impact on fertility and population growth, so that the future development policies allow for concrete and effective actions to overcome the demographic crisis in which the countries from the former communist bloc have entered. The studies on the demographic situation in the CEE countries, this research paper included, are very topical concerns for academic research and with direct interest for policy decision makers of central and local public administration.

2. Theoretical aspects on the evolution of fertility in CEE countries

Scientific literature outlined a series of explanatory hypotheses for the demographic evolution of the former communist countries of Europe. In summary, we can identify three possible conceptual approaches on fertility decline in the CEE countries. A number of studies support a strictly demographic explanation of the evolution of fertility in these countries in the post-communism period (Zakharov, 1997; Rabušic, 1996, pp. 29-42; Rychtářiková, 1999; Sobotka, Skirbekk and Philipov, 2011, pp. 267-306), on the line of the second demographic transition theory. Other authors argue that demographic decline, which is a combination of low crude birth rate, high crude mortality rates and negative net migration rates, is the result of poor economic situation, low living standards (Ranjan, 1999, pp. 25-43) and specific social transformations in transition countries (Cornia and Paniccà, 1996). A third approach takes into account both the effects of demographic transition and the social and economic transition. Thus, the low fertility rate is due to postponement of first child birth and first marriage, to lower crude birth rates, and specific conditions of economic crises in these countries (Billingsley, 2010, pp. 193-231).

According to the first hypothesis, since 1989, in the CEE countries, the conceptual explanation involves the characteristics of demographic transition (Józwiak and Kotowska, 2008, pp. 225-236). In Europe, the demographic transition took shape since the Industrial Revolution which meant the transition from a traditional society with high birth and mortality rates to an industrialized society where birth and death rates are stabilized at low levels (Coale, 1973). Starting with the 50-60's, demographic trends have been explained in the literature by the theory of the 'second demographic transition' (Van de Kaa, 1988). This is a theory of cultural change which aims to explain the evolution of fertility below the replacement rate or the postponement. According to this approach, the changes in patterns of family formation and of decision making regarding family can be explained and understood as changes in the value system regarding family behavior and fertility, and as lifestyle changes (Józwiak and Kotowska, 2008, pp. 225-236). This theory is characterized by a 'split' between marriage and procreation, resulting in an increase in the number of children outside of

marriage and grown by a single parent. Other features relevant to this theory show a further decline in fertility and postponement, the existence of advanced contraceptive methods, increasing individual needs simultaneously with increasing the autonomy of women in society and in family life. The second demographic transition requires new social challenges, expanding migration linked to the instability of property and manifestation of 'multicultural society'. There are authors (Cliquet, 1991) who argue that there is just a linear continuation of the initial demographic transition and we cannot speak about a second transition.

Analysis of the main demographic changes in the CEE countries allows the hypothesis that the demographic transition phenomenon is also recorded in this area following the coordinates of Western European countries' process (Zakharov, 1997, pp.271-290; Rabušić, 1996, pp. 29-42; Rychtářiková, 1999; Bloom *et al.*, 2010, pp. 141-158). Fertility indicators during 1960-1970 suggest a more pronounced decline for CEE states (total fertility rate below 2.0 in Hungary, Estonia and Latvia), compared with the Western states. In the communist countries, the next period, 1970-1980, was characterized by certain stability in the fertility rate, which is associated in literature with the reconsideration of the demographic and social policy measures (Sobotka, 2003, pp. 451-486). Among the measures implemented are noted pro-natalist policies (Murešan *et al.*, 2008, pp. 855-906), which aim at: providing benefits for children gradually with the number of children in family, consistent maternity allowance and extended period of maternity leave (Klinger, 1991, pp. 511-526), families with children get priority housing from the state, prohibiting abortion (Blayo, 1991, pp. 527-546), and fee for employed bachelors and employed unmarried women. Despite these policies, the decline in fertility could not be stopped, so that in the second half of the decade the total fertility rate (TFR) continued to decline.

Fertility decline in the CEE countries after 1989 can be explained mainly by changes in the values system (Balbo, 2009), transformations that appear with the passage to the democratic society. Lesthaeghe and Surkyn (2002) emphasized the link between demographic and ideational transformations, identifying three main characteristics of those: (i) the accentuation of individual autonomy in ethical, moral and political spheres; (ii) the concomitant rejection of all forms of institutional controls and authority; (iii) the rise of expressive values connected to the so called 'higher order needs' of self-actualization, self-fulfillment and a quest for recognition.

In light of empirical evaluation, the operationalization of the dimensions suggested by the theory of demographic transition can be achieved using the following variables: divorce rate, marriage rate, the rate of births outside marriage, abortion rate, and average age of women at first birth and at first marriage.

Studies on demographic transition after 1989 in the CEE countries have proposed the concept of 'demographic transition crisis' (Cornia and Panicià, 1996; Philipov and Kohler, 2001, pp. 37-60) or 'transformation anomie' (Arts and Gijssberts, 1998, pp. 143-171). Crisis situation involves failure of advanced demographic transition theory assumptions, especially about the relationship between demographic phenomena and

social and economic development, and the term 'anomie' implies a deinstitutionalization of standards and values, thus implying the idea 'without rules' by which 'cultural interpretive models lose their function' (Atteslander, 2007, pp. 489-494) and 'the gap between expectations and reality' (Rodin, 2011, pp. 221-230). In these countries, there is a particular decrease in fertility below the replacement rate of generations, and the ratio of births and deaths are reversed: the mortality rate is higher than that of birth. The immediate result is a negative natural population growth rate, so that in these countries the population decreases from one year to another due to a negative natural increase.

In fact, after 1990, the CEE countries have entered into a process of economic and social transition, characterized in particular by uncertainty and conjectural variations with a negative impact on the population. These realities have prompted the researchers to tackle the demographic change in terms of economic matters. Thus, a common assumption in the literature is the association of the new social and economic conditions of post-communist countries of CEE and significant demographic changes in these countries (Sobotka, 2003, pp. 451-486).

Changes caused by the transition to market economy and socio-economic fluctuations manifested at a psychological level in the uncertain state of the individuals, which brought attention to family planning. In this direction, Ranjan (1999, pp. 25-43) highlights the relationship between fertility and income uncertainty of the individuals within the CEE countries. Postponement is considered an optimal approach in terms of economic uncertainty. Thus, especially the period immediately following the fall of communism, it was considered that the decline in births in these states was a direct consequence of social and economic difficulties faced by the vast majority of the population in the transition period (Philipov and Kohler, 2001, pp. 37-60).

Dramatic increase in economic uncertainty is assessed by rising unemployment, low wages and reduced effectiveness of family policies found in the state support of parents. Studies focused on the economic approach to fertility evolution took into account developments at the micro and macro level. At the macroeconomic level, the main factors analyzed are economic growth, income, inflation, labor market, and education. For example, Billingsley (2010, pp. 193-231) in the process of the operationalization of the 'economic crisis' concept in the study of fertility uses four variables: GDP, inflation, labor market participation rate, and the income derived from salaries.

The third hypothesis combines both approaches outlined above and is accepted by the authors of this study. In this perspective, the theory of rational action of the individual, on the line of the second demographic transition theory, take into account also the economic and social changes in the CEE countries in transition. Studies of this category have proposed the concept of 'postponement transition' (Kohler and Kohler, 2002, pp. 233-262; Billingsley, 2010, pp. 193-231). Thus, the postponement supported by the theory of demographic transition refers to a delay that occurs as a rational response to economic uncertainties existing in the process of transition to market economy. If the theory of the second demographic transition requires a certain

economic stability and specific demographic behavior of developed countries, this approach assumes a transition economy and demographic changes that are sensitive to the transition parameters. Empirical studies which take into account this perspective propose several variants of operationalization of the determinants of fertility decline. For example, Cornia and Paniccà (1996) identified four categories of variables: (i) variables measuring the cumulative effect of the decline in marriage rates on natality; (ii) variables measuring the current economic difficulties of the population of reproductive age; (iii) variables measuring changes in family support policies; (iv) variables measuring expectations about future living standards. On the other hand, Brainerd (2009) uses two types of indicators: (i) variables measuring the economic conditions (income per capita and unemployment); (ii) variables capturing social correlates of fertility (crude marriage rate, daycare availability, housing space per capita, migration rate, male life expectancy, medical clinics per capita).

3. Data and methodology

The empirical study of this research paper is developed in three stages. In the first stage a descriptive analysis with the help of official statistical data for a longer period of time is used, from 1970 to 2010, at the macro level. The research was based on a set of variables that have been identified in the previous theoretical analysis, namely the total fertility rate (TFR) and its determinants: marriage and divorce rates, birth rates out of family, abortion rates, the average age of women at first marriage and the average age of woman at first birth, net migration rate, female labor participation, economic growth rate and unemployment rate.

The second part of the empirical study represents a multivariate statistical analysis. Using the principal components method we want to identify disparities between the ten countries, and the variables which explain these differences, at the beginning and at the end of the period. An important objective of this analysis is to identify the variables that correlate with total fertility rate. Comparing with the descriptive analysis in the first stage, on this level of the empirical study we add new variables in order to have a large picture of the demographic situation of these countries. Thus, in the analysis section of the paper we consider the indicators of mortality (crude death rate and infant mortality rate), of demographic ageing (young and old population structure, median age, dependency ratio of elderly population), the degree of urbanization and the population size.

In the third part of the study we built a panel econometric model which combines time series with cross-section analysis. With this we have a larger sample and better conditions to explain the variation of fertility in CEE countries. Independent variables in the model are chosen by the multivariate statistical analysis in the second stage of the empirical study, having the third theoretical perspective as a base which combines the demographic and socio-economic explanation. The time series data concern the main factors that allow explaining the evolution of fertility in the period 1989-2010, for ten CEE countries. In the model, TFR is used as the dependent variable. Also, we built

another two models with the same predictors in order to explain the evolution of the fertility rate for two age groups: 15-19 years and 20-24 years. These age groups show the development in fertility most clearly after 1989.

In this paper, for the statistical data we used several official sources: Eurostat, World Bank, Trans Monee, United Nations and national official statistical institutes of the countries studied.

4. Analysis of the main determinants of fertility

The hypothesis of a common pattern of evolution of the ten CEE countries studied, and the continuation of the past demographic trends, is supported by a descriptive statistical analysis of the main demographic and socio-economic indicators which influence fertility.

Pattern variation of total fertility rates, in addition to long-term downward trend, is a fluctuating variation with increases or decreases over short periods of approximately five years (see Figure 1). A possible explanation for these fluctuations could be that communist states attempt to redress the birth rate by political measures (Billingsley, 2010, pp. 193-231), but the effects are only short term, without changing the general tendency.

Analysis of evolutionary trends of total fertility rates for CEE countries on a long period of time, respectively 1970-2010, as shown in Figure 1, allows the hypothesis of a common pattern of development and compliance to the conditions laid down by the theory of second demographic transition, but in the specific conditions of this European area. An interesting topic of discussion of this evolution is the question whether 1989 is a critical point in the dynamics of fertility in CEE countries. In using a graphical analysis of trends in total fertility rates shown in Figure 1, we see at least two aspects. The first refers to short-term fluctuations in fertility which is returning with some regularity, such as, for example, during 1972-1982 and 1985-1995. Thus, the decrease in fertility since 1989 has an ancestor in the second decade of the '80s and continues after 1989. The second observation concerns changes after 1995, when fertility rates of all ten countries are approaching and register weak variations under the replacement rate which is 2.1 children per woman.

Decrease in total fertility rates after 1989 has accelerated in the first five years, without such variations being more important than previous ones, for example during 1985-1989 and 1972-1982. What is remarkable during 1989-1995 is a relatively close fertility value for all ten states and a relatively equal speed of variation. After 1995, the variation is much weaker and tends to stabilize, following a period of weak growth at the end of the study period, between 2005 and 2010. This behavior confirms the theory of demographic transition in the countries surveyed. Variations in crude birth rates tend to stabilize around a lower value (in these countries is about ten births per thousand inhabitants) and is confirmed for all countries studied. Decrease in total fertility rate below replacement rate is already attained for some countries in the period before and after 1989, with values that continue to decline and stabilize at around 1.44

in average. It is important to note however that these values are below the EU average (1.78, according to Eurostat), which indicates that the countries surveyed have a less favorable demographic situation than Western European countries. This can be correlated with the transition process of those states after 1989. The gap between the two categories of countries, which allows also a difference of social and economic potential, recognizes that an important key to this is the medium and long term stability of demographic policies promoted by Western European countries.

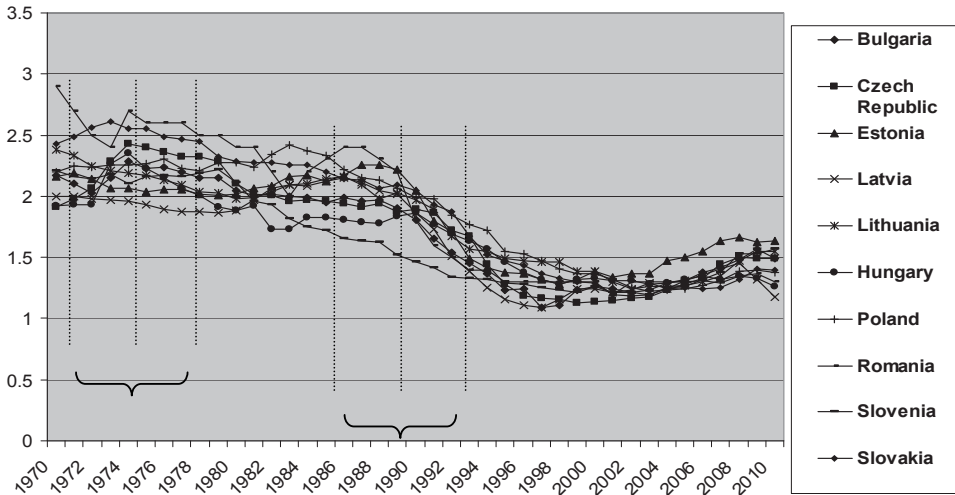


Figure 1: The evolution of total fertility rates in the period 1970-2010

Source: Computed by the authors

In line with the approach proposed in this research paper, below we propose to analyze using graphical methods, the main determinants of fertility (demographic and socio-economic) and to highlight differences and similarities between the countries surveyed.

4.1. Family

The downward trend in fertility after 1989 in CEE countries could be correlated primarily with family developments, namely marriage and divorce. Analysis of available data allow us to examine the hypothesis that an important factor in lowering fertility is decreasing marriage and increasing divorce, phenomena that are observed throughout the period across the EU. Statistics show that a slight decline in marriages could not be prevented in the CEE countries during the communist period. With the exception of Lithuania and Latvia, the other 8 of the 10 countries studied have a downward spiral for marriage. For Romania, which remains the country with the highest birth rate in the period 1970-1989, marriage rate was between $7\%_{00}$ and $9\%_{00}$ (marriages number per thousand inhabitants). The most significant decrease in marriage is registered in Slovenia, from 8.2 to 4.9, variation which can be correlated with a significant decrease in crude birth rate from 15.9 to 11.7 births per thousand

inhabitants. Slovenia has the lowest fertility rate of all countries, with values below the replacement rate since the early '80s. At the same time, during 1970-1989, divorce rates are on an upward trend in all states examined. It is noted that Estonia, Lithuania, Czech Republic and Hungary have values more than 2 divorces per thousand inhabitants, up to 3 and 4 divorces per thousand people compared to other countries with rising rates of 1 to 1.5.

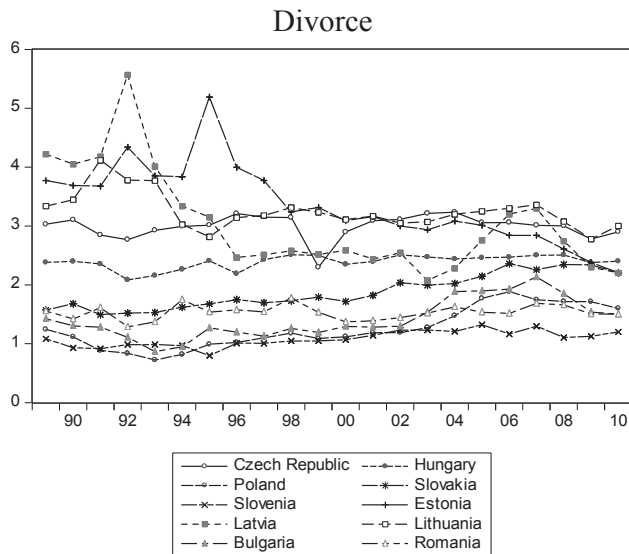
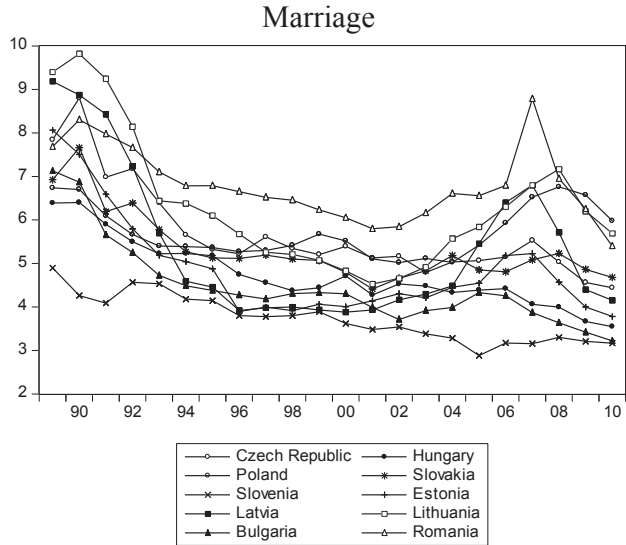


Figure 2: The evolution of marriage and divorce rates in the period 1989-2010

Source: Computed by the authors

Attempts to explain the decline of fertility on the theory of social and economic transition put an emphasis on reproductive behavior change due to mutations in the families under the new conditions of a democratic society. The question is whether significant changes occur after 1989 in the family indicators. Statistics show that marriage decline after 1989 follows approximately the pattern of the previous period, namely the trend is downward, and the variation lies between 4 and 6 marriages per one thousand inhabitants. An exception is made between the years 2007 and 2008, corresponding to policy measures to encourage marriage among those of age for generations born in 1989-1990. It should be noted that the pattern of marriage evolution is the same as fertility: higher speed variation during the first five years after 1989 and then variation resumes at the end.

Similarly, divorce rate evolution is not surprising after 1989. In Estonia, Latvia and Lithuania there are higher rates in the early period and a downward trend occurs in the next period. Czech Republic has low variations around 3, and other countries have a slight increase trend in the range of 1-2 divorces per thousand inhabitants. Basically, this trend contrasts with the advanced hypotheses of the theory that social and economic transition in particular has a major impact on the family and would cause a significant impact by increasing the divorce rate.

4.2. *Live births outside marriage*

Increasing the proportion of live births outside marriage is a characteristic of demographic transition process. By the 1980s, the proportion of children born outside marriage did not exceed 10% in most CEE countries. In some countries, especially Estonia and Slovenia, the cohabitation phenomenon and children born outside marriage began to manifest before 1989. After this year, however, all CEE countries showed an upward trend of live births outside marriage, but with large differences in intensity. The country with the highest level is Estonia (50% after 1997), followed by Slovenia and Bulgaria. The lowest level of this indicator is recorded in Poland, for the entire period.

4.3. *Postponement*

Another explanatory factor for the decline of fertility is postponement (Rodin, 2011, pp. 221-230). Increasing the average age of women at marriage and increasing average age of women at first childbirth are two indicators that are taken into account by the literature to explain the phenomenon of demographic transition. The main reason for postponement was identified by some authors as the uncertainty created by the 'anomie' (Philipov, Spéder and Billari, 2006, pp. 289-308). The link between 'anomie' and low fertility and postponement of the first child birth is considered to be stronger in the future, because women seem more affected by the 'anomie' than men (Ádnanes, 2007, pp. 45-69).

Lesthaeghe (2001) lists a number of factors contributing to postponement and the emergence of the new patterns of family formation: increased female education and female economic autonomy; rising and high consumption aspirations that created a need for a second income in households and, equally, fostered increased female la-

bor force participation; increasing investments in career development by both sexes, along with increased competition in the workplace; rising 'post-materialist' traits such as self-actualization, ethical autonomy, freedom of choice and tolerance for the non-conventional; a greater stress on the quality of life with a rising taste for leisure as well; a retreat from irreversible commitments and a desire for maintaining an 'open future'; increasing the possibility of separation and divorce, and high attention to what is called 'investment in identity'.

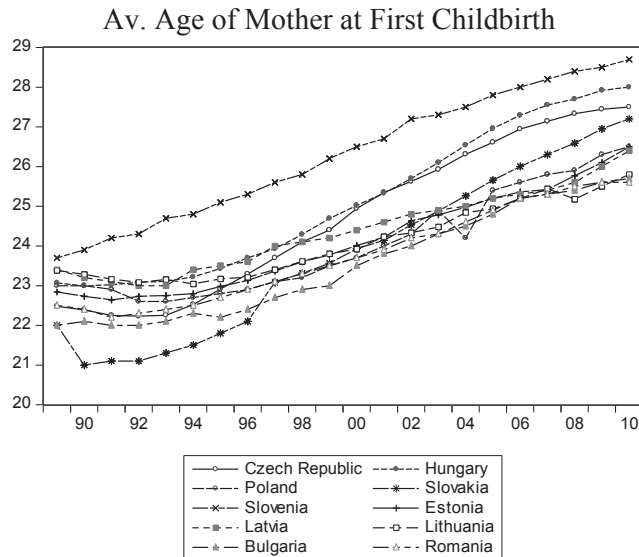
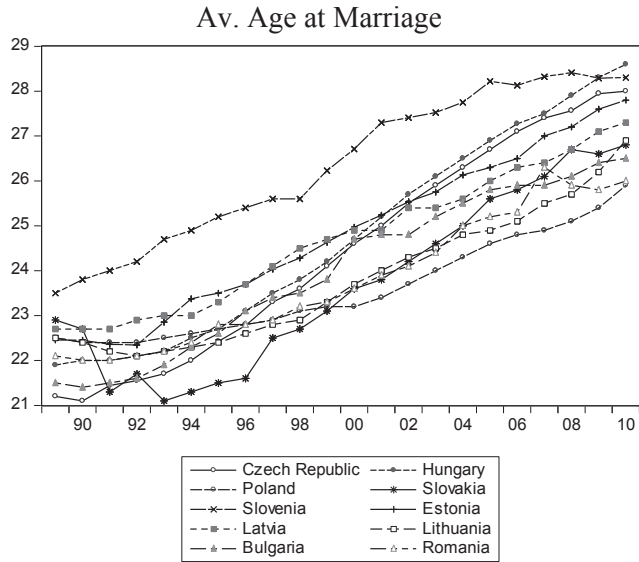


Figure 3: The evolution of postponement during 1989-2010

Source: Computed by the authors

The analysis of statistical data (UN, 2011) shows that during 1970-1989 there is an increase in the average age at first childbirth, but without very important variations. There are, also, not very high differences between countries on this indicator, Bulgaria having the lowest age of 24 years, Latvia and Lithuania the highest of 27 years. Indicator changes are on average of 1 year throughout this period of time, with low decreases and increases. Also, the average age at marriage is increasing, but with no significant fluctuations during this period. In 1970, difference between countries is approximately 1 year (values between 21 and 22 years), and in 1989 there are the same differences, the average growth of the indicator is one year, changes were between 22 and 24 years. The explanation offered by some authors for these minor fluctuations during the communist era is that births at young ages were encouraged morally and financially supported by the state (Rodin, 2011, pp. 221-230). In fact, low average age for first childbirth was a characteristic of CEE countries.

Interestingly, in the first five years after 1989, the average age of mother at first childbirth has no significant variation able to explain the faster fertility variation (see Figure 3). The rise of age is accelerated after 1995, so that at the end of the period, values are between 25 and 27, excepting Slovenia. The same trend is recorded by the evolution of women's average age at marriage. In the first years after 1989 the variation is weak, as the previous trend, but the variation speed will increase during the late '90s. Increasing the average age at marriage of women is carried out between 22-24 years in 1989 to 25-28 years in 2010.

The analysis of fertility rates specific by age groups confirms the demographic transition theory of postponement of childbirth and the decline in the first age group intervals. The age group with the dramatic change is 25-29 years. During 1989-2000, fertility rates for this age group are in a slight decrease for all states, and after 2000 the evolution takes an upward trend until the end of the period. The exception is Hungary, which shows a continuous decrease of this indicator for the whole period analyzed. After 1989, there are important decreases of fertility rates at the age groups 15-19 and 20-24, respectively, and an increase in rates to age groups 30-34 and 35-39. The age group 20-24 has suffered most in the post-communist period. Declines are from an average of 165 births per 1,000 women in this age group in 1990 to an average of 54 births in 2010 (Figure 6).

As seen in Figure 4, the first age group fertility admits important differences between countries. Even if the trend is to approximate the values, Bulgaria and Romania have a detached position with high values throughout the entire period of time. Poland and the Czech Republic are at the opposite side, with values at least two times smaller than those of the top. Increasing fertility in age groups 30-34 and 35-39 respectively is more significant after 2004, when a stabilization of the young age groups evolutions for all ten countries is produced (Figure 5).

As a conclusion for this group of indicators, we can say that the dynamics of fertility decline in the first years after 1989 is not fully explained by a similar change of variables supported by the theory of demographic transition. We observed that for

the period 1989-1994, period in which the fertility decreased with a higher speed, the postponement was not significantly increased, except for a single country, Slovenia.

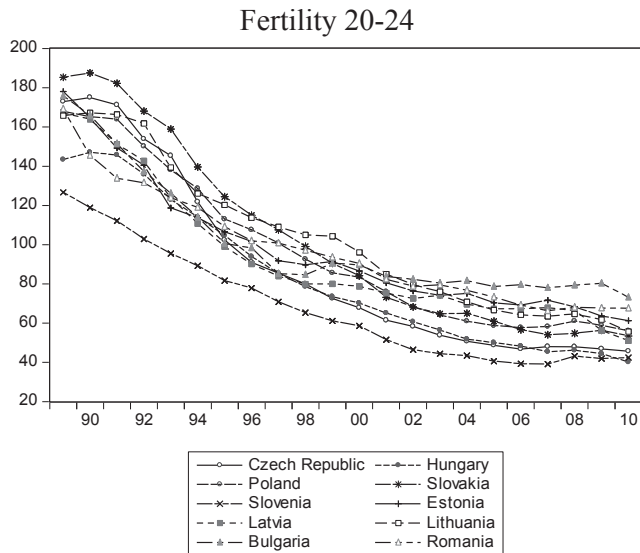
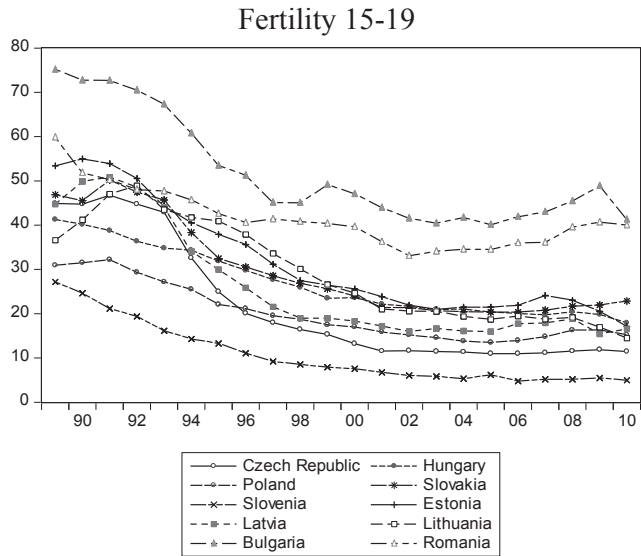


Figure 4: The evolution of specific rates of fertility in the period 1989-2010

Source: Computed by the authors

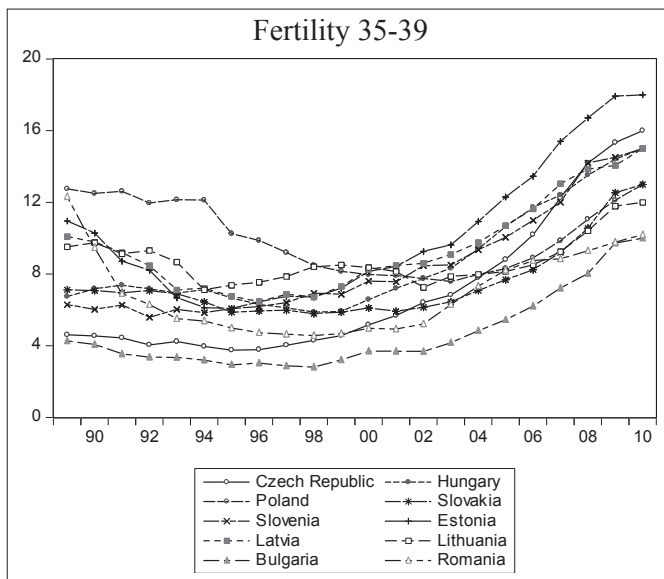
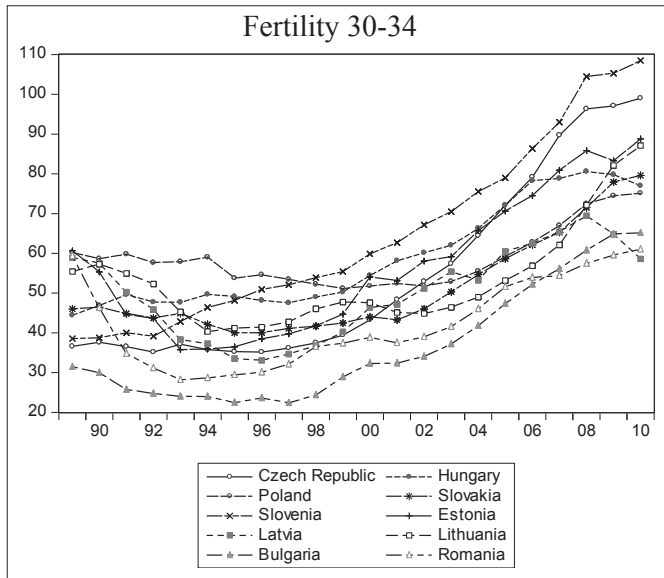


Figure 5: The evolution of specific rates of fertility in the period 1989-2010

Source: Computed by the authors

4.4. Abortion

In general, the communist regimes tried to stop the tendency of fertility decrease by various demographic policies (among them, the law of the abortion prohibition can be mentioned). For example, in Romania, the regime of Ceausescu had prohibited the abortion between 1967 and 1989. This law had short-term impact, so live births in 1967

were double than in the previous year, and the TFR was 3.7 children per woman, being the highest among the CEE countries. Overall, despite these demographic policies the tendency of fertility decrease could not be stopped. By the late 1980s, reproductive behavior of women in the CEE countries is characterized by limited access or availability of modern contraceptive methods, lack of sexual education, and use of abortion (Blayo, 1991, pp. 527-546; Stloukal, 1999, pp. 23-37). After 1989, applying liberal policies of abortion in most of the CEE countries, but accompanied by increased sex education among young people and by improved access to diverse modern contraceptive methods, justify the decrease of abortion rate over the period analyzed according to Figure 6. An exception to the liberalization of abortion is Poland, which in 1993 adopted a law to prohibit it. For Romania, the number of abortions was very high throughout the period, the liberalization of abortion after 1989 resulting in a significant detachment in intensity compared to all other nine CEE countries during 1989-1997, the period of 'boom' began in 1990 (about 3,152 abortions per 1,000 live births, according to Eurostat, 2012). Thus, Romania is on the first place over the countries studied. Philipov and Dorbritz (2003) say that, in general, high prevalence of abortion is generated by the high level of lack of family planning.

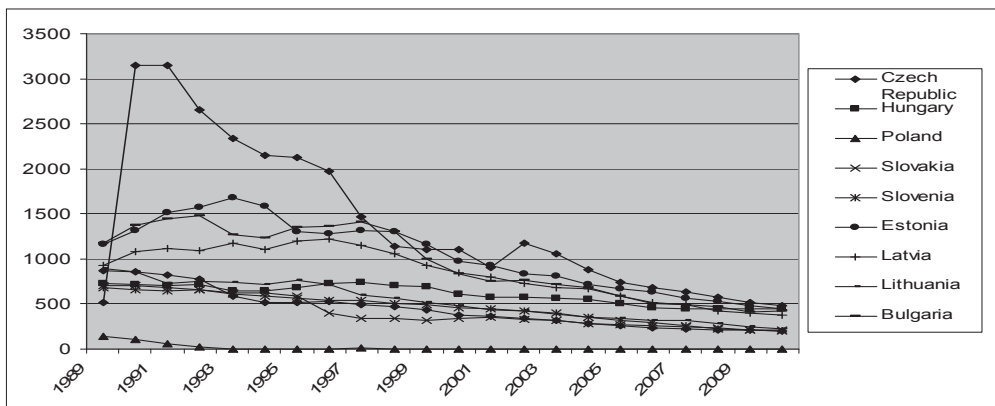


Figure 6: The evolution of abortion rates (abortions per 1,000 live births) during 1989-2010

Source: Computed by the authors based on data provided by Eurostat, 2012

Since 2009, abortion rates have tended to stabilize in most countries studied, around of 300-500 abortions per 1,000 live births. The exception is still Poland, which recorded values around 1 abortion per 1,000 live births.

4.5. Migration

Official statistical data for migration are underestimated, but can be used as long as it is accepted that the situation is similar for all CEE countries. As noted by Philipov (2002), in the first years after 1989 there was a strong tendency of populations from communist countries to migrate to the Western European countries, as is the case of Romania. This trend can be correlated with decreased fertility in the first 5 years after the fall of the communist wall. According to official statistical data on migration

provided by Eurostat, we can identify three groups of countries. The first group consisted of countries with a negative net rate of migration for the entire period (Latvia, Lithuania, Poland, Romania, and Bulgaria), registering important variations in the first part of the period analyzed. The second category consists of countries that, a few years after the regime change, have positive net migration rates (Estonia, Slovenia, and Slovakia). The third category has a positive net migration rate for the entire period (Hungary and the Czech Republic). Although the statistical data do not fully cover the phenomenon, we expect the migration indicator to be positively correlated with the fertility indicator, as is the case of Western European countries, where fertility recovery is largely supported by the phenomenon of immigration.

4.6. Women participation to the labor market

Fertility decline in Europe was associated with changes in family behavior which in turn have started in the context of socio-economic and cultural changes occurring with the modernization of society (Józwiak and Kotowska, 2008, pp. 225-236). These changes to family value are manifested by great expectations about a partner, quality of partnership and children, due to the involvement of women in the labor market and increases in their education (Sobotka, 2004).

For Esping-Andersen (2005) the changing role of women is 'the core revolutionary impulse behind ongoing social change'. From our point of view, the double role of women in society, as a participant to the labor market and as a mother, was the same during the communist period and after 1989. Thus, the hypotheses of the negative impact of socio-economic changes have occurred since 1989 on fertility is not supported in the ten CEE countries if we analyze, for example, the evolution of the participation of women in the labor market.

Statistical data show fluctuations in the share of women in the labor market throughout the period with different intensities from one country to another. A trend of slight decrements in indicative values is observed for all countries and throughout the period. The Baltic countries are an exception, which after 1999 show a slight increase in this indicator. We expect this indicator to have a positive but weak impact on fertility since 1989 in CEE countries.

4.7. Economic growth

Some research papers consider there is a close link between economic recession and decline of fertility when they interpret the fertility trends. In analysis, the decline in gross domestic product (GDP) is often correlated with a decrease in the fertility rate (Goldstein, Sobotka and Jasilioniene, 2009, pp. 663-700). In the case of post-communist countries of CEE, Billingsley (2010, pp. 193-231) found that GDP change was positively correlated with fertility rates in all age groups above 20, in a model with inflation, wage growth, and employment. She also found, however, that GDP rise was positively linked to fertility postponement. A similar result was obtained within a larger model in the fertility rate analysis, done on the case of Hungary (Aassve, Billari and Spéder, 2006, pp. 127-152). Sobotka (2011) agrees that the economic crisis in CEE

countries has a negative impact on fertility. On the other hand, demographic transition theory states that positive economic changes (measured by the level of GDP, GDP growth etc.), the quality of public and private services, rapid technological changes (which improve quality of life), and higher level of prosperity, so the economic progress, in general, usually leads to lower fertility and stimulate people to distance themselves from previous patterns of young age at first childbirth.

According to Figure 7 we can see that the changing of socio-economic framework in CEE countries after 1989 involved changes in GDP over the period analyzed in all

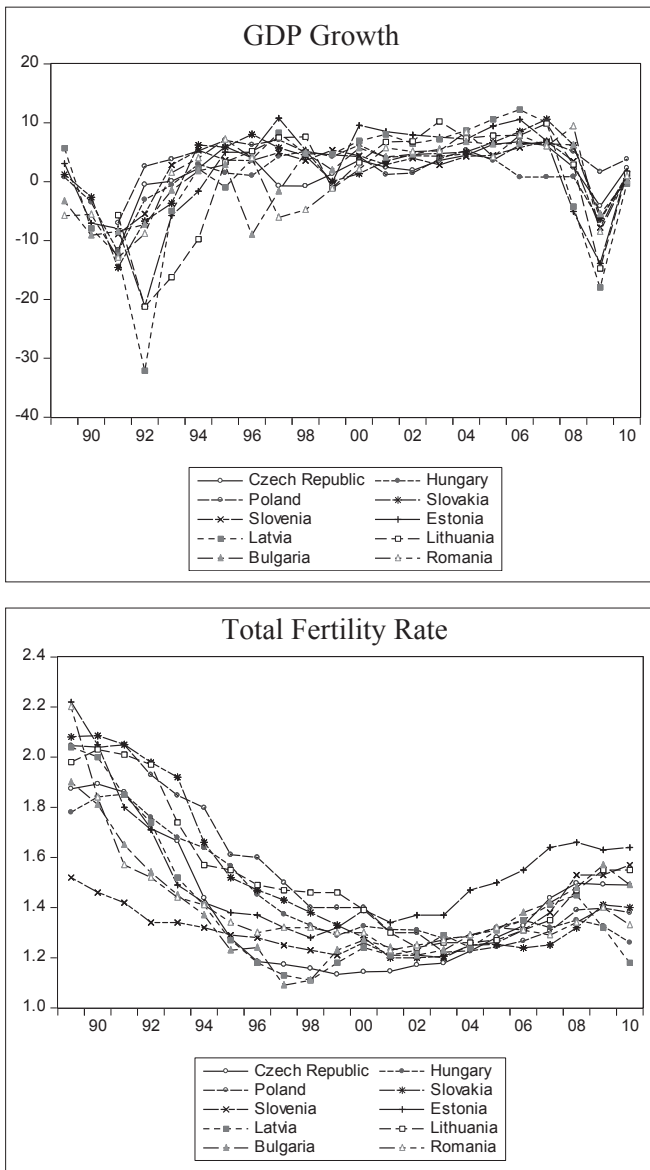


Figure 7: Evolution of GDP and TFR during 1989-2010

Source: Computed by the authors

states. We can see an economic recession in the first period (1989-1992), especially in Latvia, followed by a growth trend in all countries with slight fluctuations. Since the economic crisis in 2008, GDP growth values were close to that of 1992. 2010 involved a relative recovery in GDP in the CEE countries. Comparing the two indicators, GDP and TFR, show us that they have the same trend in the period 1990-1992, and then TFR have had an inverse trend to the evolution of GDP.

The analysis of long term trends of the two variables, TFR and GDP growth, and the approach used in this research paper, allows us the hypothesis of a negative link between the two variables for the ten CEE countries during 1989-2010.

4.8. Unemployment

The relationship between unemployment rate on the one hand, the formation of couples and fertility rates, on the other hand, is seen in many studies (Sobotka, Skirbekk and Philipov, 2011, pp. 267-306) to be quite close. In fact, unemployment rising is considered a specific indicator of the economic crisis impact on women and men of reproductive age. Thus, high and persistent unemployment among young people, simultaneously with the existence of an unstable labor market, namely a high level of uncertainty in employment, has become one of the most important explanations for the postponement formation of couples and marriage and so, of the first childbirth.

Regarding the implications of unemployment on fertility, the literature suggests that unemployment has different psychological influences on men and on women (Sobotka, Skirbekk and Philipov, 2011, pp. 267-306). Thus, for men, unemployment is perceived more acutely and is a factor of delaying the birth of a child, considering that the man is the main support of the family, while for women unemployment is not necessarily regarded as a delay factor for shaping the family and for giving birth to a child.

For the ten CEE countries, the unemployment rate has fluctuated since 1989. Until 1994, the general trend is the increasing in all countries, but with differences between them. Czech Republic, Slovenia and the Baltic countries have a much lower growth compared to other countries where the communist system was stronger. Countries with the highest unemployment levels are Slovakia, Bulgaria and Poland. In the second part of the 90's, unemployment rate has a period of slight decrease. The period 1999-2004 is characterized by the growth of this indicator. Between 2005 and 2008 unemployment has a significant decline in these countries (with the differences between them, with values between 4% and 10%). After 2008, the global economic crisis generates a new increase of unemployment. This oscillating evolution on long term of unemployment suggests its weak influence on TFR.

5. Cross section analysis of the demographic situation

The study of demographic trends for the ten CEE countries suggests that developing a comparative multivariate analysis at the beginning and at the end of the period would be representative. We want to identify groups of countries based on the

value of TFR and also correlations between socio-economic variables and TFR at the beginning and at the end of the period. Because of the tendency of demographic stabilization in these countries, we expect to have two different pictures for 1989 and 2010. Using principal components method, we can identify demographic variables that explain the differences and similarities between countries and also the variables correlated with TFR.

The analysis of principal components allows us to identify correlations between variables which we use and also how the units of population are grouped according to the correlation coefficients between each variable and factorial axis. Factorial axes are linear combinations of the variables analyzed on which these variables and population units are projecting. These axes or principal components allow highlighting correlations that exist between variables, and mark the sign of these relations. Of all possible axes the first two that can better explain the differences between the studied population units are chosen. Analysis of principal components method also represents a preliminary method of econometric modeling, because it permits identification of the variables that correlate significantly with the variable of interest, in this case being TFR.

In this analysis we use a set of demographic and economic indicators to highlight similarities and differences between the ten countries. The list of these variables is presented in Table 1. Insignificant variables were eliminated from the analysis and

Table 1: The correlation coefficients between variables and each factorial axis

1989			2010		
	Component Matrix ^a			Component Matrix ^a	
	1	2		1	2
old_age_dep	,934	-,069	old_age_dep	,925	-,049
TFR	-,252	,858	TFR	,068	,427
Death	,865	,159	Death	,654	-,712
Abort	,573	,491	Abort	,659	-,208
Marriage	,207	,853	Marriage	-,791	-,486
Av_age_marr	-,531	-,037	Av_age_marr	,515	,645
Urb_pop	,730	,433	Urb_pop	,396	-,307
GDP_grow	,199	,567	GDP_grow	-,639	,301
Migr_net	-,562	,445	Migr_net	-,085	,493
Median_Age	,908	-,292	Median_Age	,850	,278
Pop	-,520	-,116	0_14_age	-,709	-,198
0_14_age	-,826	,286	65_over_age	,933	-,042
65_over_age	,967	-,124	Divorce	,014	-,182
Birth	-,552	,804	Lab_fem	,474	-,350
Inf_death	-,419	,206	Pop	-,718	-,170
Divorce	,543	,728	Birth	-,402	,385
Av_age_birth	,011	-,085	Inf_death	,052	-,685
Lab_fem	,087	,573	Av_age_birth	,026	,869
Life_exp	-,123	-,587	Life_exp	-,303	,910
Birth_out	,317	-,059	Birth_out	,819	,450
Unemplo	-,128	-,631	Unemplo	-,126	-,352

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Source: Computed by the authors

only those significant indicators were kept, so that the two factorial axes explain 70% of total variance. The results of the principal components analysis for 1989 and 2010 are presented in Figures 8 and 9.

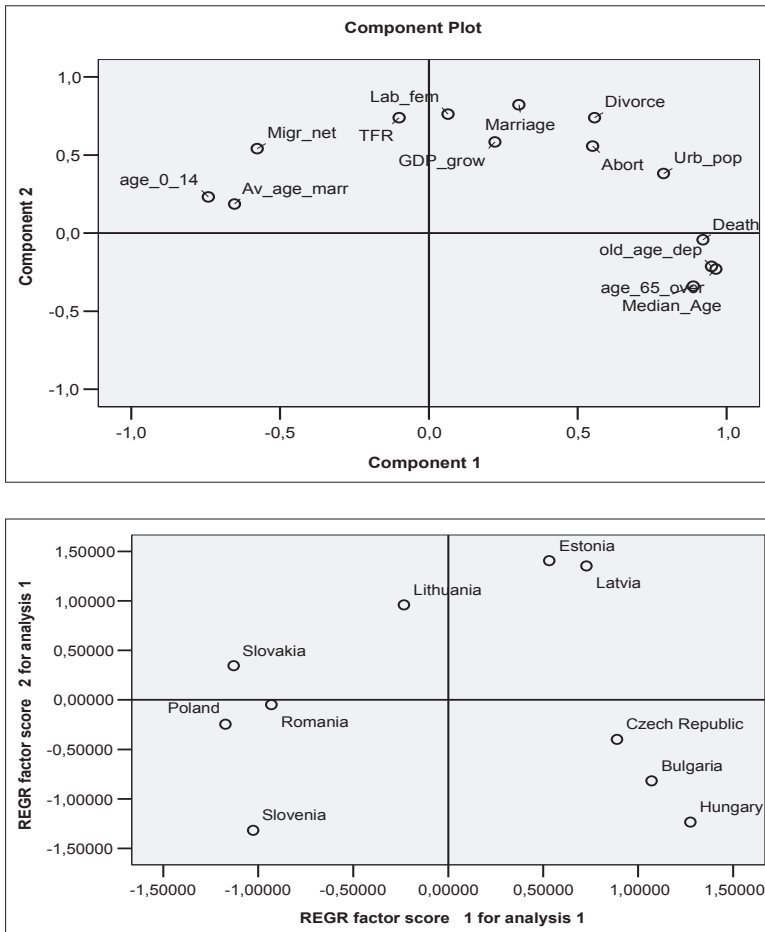


Figure 8: The variables and the countries position on the two factorial axes in 1989

Source: Computed by the authors

According to the principal components method, in 1989, the position of demographic variables on the two axes highlights the features of the ten countries studied in the early post-communist period. In Table 1 we can identify variables with high correlation coefficient, which plays a significant role in explaining differences between countries on each factorial axis. Eliminating insignificant variables, we obtained the diagram in Figure 8. Thus, variables with a positive and significant correlation coefficient with the first factorial axis are: mortality rate, demographic ageing indicators (proportion of elder population, the median age, dependency ratio of elderly population) and the urban population. Negative position on the first factorial axis is taken by the young people and average age at first marriage of women. On

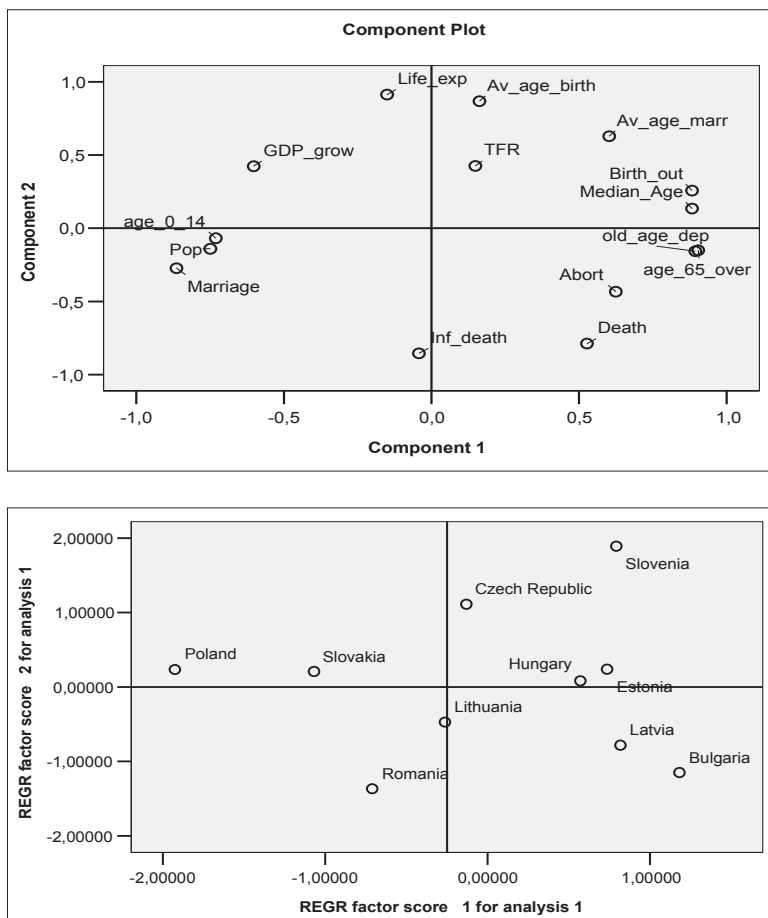


Figure 9: The variables and the countries position on the two factorial axes in 2010

Source: Computed by the authors

the second factorial axis, there is only positive position of TFR, the participation of women in the labor market, marriage rate and growth rate. Indicators of abortion, divorce and net migration have a median placement which can contribute to each factorial axis.

In 1989, demographic variables used in this study allow us to clearly identify three groups of countries. In accord with the first factorial axis, we can identify two groups. The first group of countries (Slovakia, Romania and Poland) share high values of young population and average age at first marriage of women, and low indicators of demographic ageing, mortality and degree of urbanization. The opposite situation is the second group which consists of Bulgaria and the Czech Republic. The third group consists of Lithuania, Estonia and Latvia, which are in a positive position on the second factorial axis, with high values for TFR and other indicators strongly correlated with it. Hungary and Slovenia are distinguished by extreme pole positions. Slovenia is the exponent with the lowest values in relation to variables on the second factorial

axis, which is also the TFR and Hungary with the highest values for the variables of the first factorial axis.

In 2010 there is another set of variables that do not play an important role in explaining differences between countries, including TFR. Figure 9 shows that the first factorial axis is formed by a group of variables that registered small modifications from the year 1989. The positive position is occupied by births outside marriage, and demographic ageing variables and negative position is occupied by marriage, population and proportion of young population. As expected, TFR does not play a significant role in explaining differences between countries. On the second factorial axis stands life expectancy and average age of women at first birth, with a positive position, and infant mortality, with a negative position. Crude rate of mortality, abortion rate and growth rate variables occupy an intermediate position.

In 2010, the differences between the ten countries are attenuating. Variables of the first factorial axis show only the position of Poland in contrast to Bulgaria and on the second factorial axis of Romania in contrast to the Czech Republic. Slovenia remains in a special position with high positive values for variables from the both factorial axes.

6. Econometric modeling for fertility during 1989-2010

The evolution of total fertility rate since 1989 in the ten CEE countries studied shows us a similar pattern of variation, and similar characteristics of these states allow modeling the data using a panel estimation method in order to explain the evolution of fertility in the ten CEE countries between 1989 and 2010. The explanatory variables in the model are those that have emerged from the multivariate analysis as variables that are correlated with TFR. The final model introduced the following variables: TFR as dependent variable and the marriage rate, divorce rate, abortion rate, economic growth rate, unemployment rate, the proportion of female employment and net migration rate as independent variables.

In accord with the literature (Brooks, 2008), using panel econometric model requires the establishment of modeling conditions and choosing a type of model. Since the number of states used in the panel is relatively small, we will choose to build a model with fixed effects.

Using the panel estimation method, we need to be sure that all the variables in the model are stationary. For this purpose, we use the Levin-Lin-Chu Test for the panel unit root test. As a result of testing, the variables are stationary and can be used in the model without being transformed.

The panel used is balanced (balanced panel) because for each country we use the 22 observations for the independent variables corresponding to the 22 years between 1989 and 2010. The general equation of the model is:

$$Y_{it} = \beta_{0i} + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_p X_{pit} + \varepsilon_{it}$$

where: $i = \overline{1,10}$ is the index referring to the 10 states; $t = \overline{1,22}$ is the index comprising the 22-year period analyzed; $p = 7$ the number of predictors in the model; β_{0i} are

fixed unknown parameters and capture systemic differences among panel observations for each country; $\beta_j, j = \overline{1, p}$ are regression coefficients, which are the same for each country.

For this model, the regression coefficients for each variable are considered constant, both in time and for each country. This hypothesis is supported by similar developments of TFR in the ten countries for those 22 years. For identifying the individuality of each country, we consider in the model that intercepts varies from country to country, but remains constant over time. For this type of econometric model, there are two problems which are mainly determined by the nature of each type of analysis that combines: error autocorrelation and cross-section heteroskedasticity. In addition, because of similarities between countries, we expect the model to have cross-sectional heteroskedasticity and contemporaneous correlation.

For the first problem, the solution is to add an autoregressive component in model for the residual component of the form: $\varepsilon_t = \rho\varepsilon_{t-1} + u_t$, where u_t is a residual variable of 'white noise' that respects classical regression model assumptions. Autocorrelation coefficient of error is estimated in Table 2.

For the second problem, the Generalized Least Squares method was used, in which case the estimates of the variances are used in a weighted least squares procedure. We estimate a feasible GLS (Generalized Least Square) with cross-section SUR specification correcting for both cross-section heteroskedasticity and contemporaneous correlation. Modeling results are presented in Table 2. Regression coefficients for independent variables are significant with a probability of 0.95. The exception is the unemployment rate variable, which has no partial significant influence on TFR and participation of women in the labor market variable has a role, but for a lower probability.

Lack of significant influence of the unemployment rate on TFR confirms our hypothesis that since 1989 lower fertility rate is a continuation of trends from the previous period, and the uncertainty created by the society transition after the fall of communism does not seem to play an important role in the countries studied. It is interesting to note the positive influence of the degree of participation of women in the labor market on the TFR, which is also a legacy of the previous period.

The other significant variables of the model are not a surprise. Negative sign of the coefficients for economic growth rate, the rate of divorce and abortion confirms theories of literature and the assumptions made in this research paper. Also, the positive value of regression coefficient associated with marriage rate corroborates with typical demographic behavior for countries of this region, but also for the evolution determined by demographic transition. Positive sign of regression coefficient for net migration rate confirms another hypothesis sustained in this research paper, that fertility recovery has an important support in migration, and demographic policies should take into account this factor.

Table 2: Results of the econometric model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLO	0.000170	0.001427	0.118849	0.9055
MIGR_NET	0.001337	0.000569	2.348176	0.0199
MARRIAGE	0.043071	0.006371	6.759982	0.0000
LAB_FEM	0.009919	0.005422	1.829360	0.0689
GDP_GROWTH	-0.004012	0.000453	-8.858928	0.0000
DIVORCE	-0.018286	0.008958	-2.041265	0.0426
ABORT	-0.006433	0.001270	-5.065512	0.0000
C	0.714536	0.255797	2.793367	0.0057
AR(1)	0.842456	0.019467	43.27570	0.0000
R-squared	0.942507	Durbin-Watson stat		1.857854

Source: Computed by the authors

The estimated equation of the model is as following:

$$TFR = 0.714536144326 + [CX=F] + 0.000169556355308*UNEMPLO + 0.00133659961285*MIGR_NET + 0.0430705685817*MARRIAGE + 0.00991879321887*LAB_FEM - 0.00401201124845*GDP_GROWTH - 0.0182855303669*DIVORCE - 0.00643336497899*ABORT + [AR(1)=0.842456180189]$$

Table 3 presents the estimates for the cross-section effects $[CX=F]$ or fixed effects which make the differences between countries. These estimates are used to obtain the estimated equation of TFR of each country by introducing the proper effect in the equation above.

Table 3: Estimates effects in the CEE countries

Nr.	Country	Effect
1	Czech Republic	0.004947
2	Hungary	0.045470
3	Poland	-0.028395
4	Slovakia	-0.006410
5	Slovenia	0.076081
6	Estonia	0.119746
7	Latvia	-0.135001
8	Lithuania	0.072531
9	Bulgaria	0.002960
10	Romania	-0.151929

Source: Computed by the authors

Modeling errors comply with classical assumptions as Durbin-Watson test (Table 2) and the graphical representation of Figure 10 indicates, showing the normality of errors.

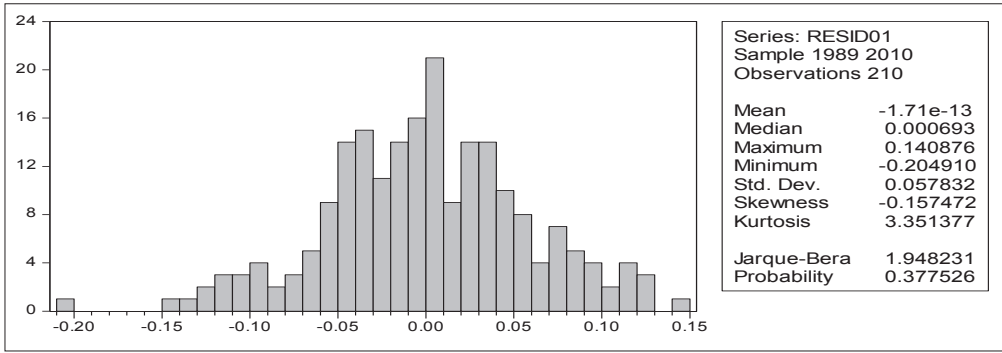


Figure 10: Errors distribution resulting from modeling

Source: Computed by the authors

7. Concluding remarks

Fertility decline in CEE countries is a current topic which ‘sparks’ the research work of both theoretical and empirical studies. The three possible hypotheses mentioned by literature on the evolution of fertility in these countries after 1989 are supported by empirical data at the micro or macro level. In general, these studies are made on short or medium term, with a special focus on demographic trends after the fall of the communist wall. The analysis in this paper concerns a more homogeneous group of countries in the CEE region on long-term demographic trends.

The close pattern of these ten countries’ demographic evolution, before and post-1989’s, sustain the approach whereby fertility decline is achieved as long-term phenomena that meet the basic assumptions of the theory of demographic transition, but in the social and economic parameters specific to this European area. Basically, we believe that post-1989s’ changes affect demographic behavior in these countries, but not with the magnitude suggested by the supporters of the economic crisis and transition theory’s impact over these countries. Recent studies on communist demographic behavior indicate a continuation of this pattern after 1989, highlighting the high inertia of demographic phenomena, but also the behavioral values that change only on the medium and long term. We appreciate that this may be one of the most productive research lines on demographic trends in the CEE countries to enable consistent explanations of developments in post-communist period.

The first part of this empirical paper study demonstrates that for the main demographic fertility determinants, after 1989, the demographic trend is continued as in the 1970-1989 period. Pro-natalist policy measures promoted by the communist regime had only a short term impact on these trends. The general European demographic transition model also reaches the communist space, and the result of this widespread phenomenon is expected to lead to a stabilization and weak variation in key demographic indicators. This study shows that this stability is achieved over the late 1990s, when the fertility and its determinants are similar for the ten countries studied. But what is remarkable is that this state of stability involves positioning fertility indicators

below the EU average. This situation can be explained in relation to socio-economic conditions of these countries, among which stand out fluctuations on economic development, migration, reproductive and family planning education. Compared with Western European countries that have consistent policy on fertility recovery, in the CEE countries such measures have been seriously affected by the transition period and did not have the expected impact.

Multivariate statistical analysis identified the variables that correlate significantly with TFR and the differences among the ten CEE countries, both at the beginning of the analysis and its end. Especially in 1989, the existence of demographic differences that can be easily linked to the historical and geographical specificity is confirmed, as is the case of Baltic countries, which form a distinct group among the ten countries. The differences between countries are attenuated in 2010, but Slovenia remains distinguished from the other nine members of the group of countries, both in 1989 and 2010.

Econometric modeling allowed explaining the TFR evolution and age groups fertility since 1989 using the demographic and socioeconomic variables set identified with the help of literature and multivariate statistical analysis. Also, the models built allow validation of assumptions made in this paper: the fact that unemployment has no significant effect on the TFR shows that the impact of the crisis and uncertainty of the transition measured by this variable is not relevant for the entire period studied, except when explaining the evolution of fertility in the age group 15-19 years. Although official data on migration are generally underestimated, the positive effect of migration is validated by the model and supports the hypothesis that positive net migration is a possible source of recovery of fertility (effect visible in Western countries). A negative effect of social changes after 1989 can be assessed by the significant impact of divorce and abortion on fertility; significant negative impact of economic growth confirms the theory of demographic transition which agrees that economic development in CEE countries is also accompanied by fertility decline. Inertia of behavioral model of the communist period, which gave women a double social role, the mother and the economic factor, is observed after 1989 also, respectively, the direct influence of women's participation on the labor market over fertility.

Based on these results, we believe that the effort of central and local governments for developing efficient public policies to encourage and sustain the demographic growth tendencies should concentrate on the particularities of each CEE country. One of these particularities is linked to the past of these countries, where the active role of women, both in the demographic and in the socio-economic plans, needs to be properly evaluated and carefully supported. CEE countries have already reached the situation where demographic indicators do not register significant fluctuations, but the overall situation is negative. Demographic recovery and the future crucially depends on the policies adopted, and the role of local and central public administration is essential in finding the best measures to implement them and to ensure continuity on the medium and long term.

This study has several limitations related to the methodology, namely that of working with data at the macro level, the panel model with fixed effects allows the use of a limited number of predictors, and the modeling is achieved only for the period 1989-2010, mainly due to the lack of statistical data.

References:

1. Aassve, A., Billari, F.C. and Spéder, Z., 'Societal Transition, Policy Changes and Family Formation: Evidence from Hungary', 2006, *European Journal of Population*, vol. 22, no. 2, pp. 127-152.
2. Ádnanes, M., 'Social Transitions and Anomie among Post-Communist Bulgarian Youth', 2007, *Young*, vol. 15, no. 1, pp. 49-69.
3. Arts, W. and Gijssberts, M., 'After the Velvet Revolutions. Altered Life-Chances, Fragile Legitimacy, and Split-Consciousness in Post-Communist Eastern Europe', 1998, *Social Justice Research*, vol. 11, no. 2, pp. 143-171.
4. Atteslander, P., 'Social Transformation in the Age of Globalization. A Challenge to Reduce Anomie and to Increase Social Capital', 2007, *International Review of Sociology*, vol. 17, no. 3, pp. 489-494.
5. Balbo, N., 'Recent Fertility Trends and Second Birth Decision-making in Georgia', 2009, The XXVI IUSSP International Population Conference Marrakech, Morocco.
6. Billingsley, S., 'The Post-Communist Fertility Puzzle', 2010, *Population Research and Policy Review*, vol. 29, no. 2, pp. 193-231.
7. Blayo, C., 'Les modes de prévention des naissances en Europe de l'Est', 1991, *Population*, vol. 46, no. 3, pp. 527-546.
8. Bloom, D.E., Canning, D., Fink, G. and Finlay, J.E., 'The Cost of Low Fertility in Europe', 2010, *European Journal of Population*, vol. 26, no. 2, pp. 141-158.
9. Brainerd, E., 'The Demographic Transformation of Post-Socialist Countries: Causes, Consequences, and Questions', 2009, Paper prepared for the UNU-WIDER Conference 'Reflections on Transition: Twenty Years After the Fall of the Berlin Wall', Helsinki, September 18-19, 2009.
10. Brooks, C., *Introductory Econometrics for Finance*, London: Cambridge University Press, 2008.
11. Cliquet, R., 'The Second Demographic Transition: Fact or Fiction?', Council of Europe Population Studies No. 23, Strasbourg: Council of Europe, 1991.
12. Coale, A., 'Demographic Transition', International Population Conference, Liège: IUSSP. 1973.
13. Cornia, G.A. and Paniccià, R., 'The Transition's Population Crisis: An Econometric Investigation of Nuptiality, Fertility and Mortality in Severely Distressed Economies', UNICEF ICDC's Innocenti Occasional Paper No. 49, 1996.
14. Esping-Andersen, G., 'A Jobless and Childless Europe?', 2005, in Boeri, T., Del Boca, D. and Pissarides, C. (eds.), *Women at Work: An Economic Perspective*, Oxford: Oxford University Press, 2005, pp. 268-274.
15. Goldstein, J.R., Sobotka, T. and Jasilioniene, A., 'The End of 'Lowest-Low' Fertility?', 2009, *Population and Development Review*, vol. 35, no. 4, pp. 663-699.
16. Józwiak, J. and Kotowska, I.E., 'Decreasing Birth Rates in Europe: Reasons and Remedies', 2008, *European View*, vol. 7, no. 2, pp. 225-236.

17. Klinger, A., 'Les politiques familiales en Europe de l'Est', 1991, *Population*, vol. 46, no. 3, pp. 511-526.
18. Kohler, H.P. and Kohler, I., 'Fertility Decline in Russia in the Early and Mid 1990s: The Role of Economic Uncertainty and Labour Market Crises', 2002, *European Journal of Population*, vol. 18, no. 3, pp. 233-262.
19. Lesthaeghe, R., 'Postponement and Recuperation: Recent Fertility Trends and Forecast in Six Western European Countries', Interuniversity Papers in Demography, IPD-WP 2001-1, Vrije Universiteit Brussels, Universiteit Gent, 2001.
20. Lesthaeghe, R. and Surkyn, J., 'New Forms of Household Formation in Central and Eastern Europe: Are They Related to Newly Emerging Value Orientations?', Interuniversity Papers in Demography, IPD-WP 2002-2, Vrije Universiteit Brussels, Universiteit Gent, 2002.
21. Mureşan, C., Hărăguş, P.T., Hărăguş, M. and Schröder, C., 'Romania: Childbearing Metamorphosis within a Changing Context', 2008, *Demographic Research*, vol. 19, no. 23, pp. 855-906.
22. Philipov, D. and Dorbritz, J., 'Demographic Consequences of Economic Transition in Countries of Central and Eastern Europe', Population Studies No. 39, Strasbourg: Council of Europe Publishing, 2003.
23. Philipov, D. and Kohler, H.P., 'Tempo Effects in the Fertility Decline in Eastern Europe: Evidence from Bulgaria, the Czech Republic, Hungary, Poland, and Russia', 2001, *European Journal of Population*, vol. 17, no. 1, pp. 37-60.
24. Philipov, D., 'Fertility in Times of Discontinuous Societal Change: The Case of Central and Eastern Europe', MPIDR Working Paper WP 2002-024, Max Planck Institute for Demographic Research, Rostock, 2002.
25. Philipov, D., Spéder, Z. and Billari, F., 'Soon, Later, or Ever? The Impact of Anomie and Social Capital on Fertility Intentions in Bulgaria (2002) and Hungary (2001)', 2006, *Population Studies*, vol. 60, no. 3, pp. 289-308.
26. Rabušic, L., 'On Marriage and Family Trends in the Czech Republic in the Mid-1990s', 1996, *Socialni Studia*, vol. 38, no. 1, pp. 29-42.
27. Ranjan, P., 'Fertility Behaviour under Income Uncertainty', 1999, *European Journal of Population*, vol. 15, pp. 25-43.
28. Rodin, J., 'Fertility Intentions and Risk Management: Exploring the Fertility Decline in Eastern Europe during Transition', 2011, *AMBIO*, vol. 40, no. 2, pp. 221-230.
29. Rychtariková, J., 'Is Eastern Europe Experiencing a Second Demographic Transition?', Report presented at the 'Lowest-Low' Fertility Workshop, Max-Planck Institute for Demographic Research, Rostock, 1999.
30. Sobotka, T., 'Does Persistent Low Fertility Threaten the Future of European Populations?', in Surkyn, J., Deboosere, P. and Van Bavel, J. (eds.), *Demographic Challenges for the 21st Century. A State of Art in Demography*, Brussels: Vubpress, 2008, pp. 27-89.
31. Sobotka, T., 'Re-Emerging Diversity: Rapid Fertility Changes in Central and Eastern Europe after the Collapse of the Communist Regimes', 2003, *Population*, vol. 58, no. 4, pp. 451-486.
32. Sobotka, T., *Postponement of Child Bearing and Low Fertility in Europe*, Amsterdam: Dutch University Press, 2004.

33. Sobotka, T., Skirbekk, V. and Philipov, D., 'Economic Recession and Fertility in the Developed World. A Literature Review', 2011, *Population and Development Review*, vol. 37, no. 2, pp. 267-306.
34. Sobotka, T., Zeman, K. and Kantorová, V., 'Demographic Shifts in the Czech Republic after 1989: A Second Demographic Transition View', 2003, *European Journal of Population*, vol. 19, no. 3, pp. 249-277.
35. Stloukal, L., 'Understanding the 'Abortion Culture' in Central and Eastern Europe', in David, H.P. (ed.), *From Abortion to Contraception. A Resource to Public Policies and Reproductive Behavior in Central and Eastern Europe from 1917 to the Present*, Westport, Connecticut: Greenwood Press, 1999, pp. 23-37.
36. Van de Kaa, D., *The Second Demographic Transition Revisited: Theories and Expectations*, Symposium on Population Change and European Society, Florence: IUSSP, 1988.
37. Zakharov, S.V., 'Fertility Trends in Russia and the European New Independent States: Crisis or Turning Point?', 1997, *Population Bulletin of the United Nations*, Special Issue no. 40/41, pp. 292-317.
38. ***Eurostat, 2012, [Online] available at <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes>, accessed on February 15, 2014.
39. *** UN, Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section, 2011, [Online] available at <http://esa.un.org/unup/>, accessed on February 15, 2014.