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EUROPOP2008: A SET OF POPULATION PROJECTIONS FOR THE EUROPEAN UNION*

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Giampaolo LANZIERI**

1. INTRODUCTION

The Eurostat Population Projections 2008-based (EUROPOP2008) is the latest round of a series of exercises[1] on population projections released by Eurostat, the Statistical Office of the European Communities, and mainly used as input for further analysis by the Services of the European Commission. This new set of projections covers all the Member States[2] of the European Union (EU) plus Norway and Switzerland for the period 2008-2061.

Nowadays, the socio-economic implications of the demographic trends in the EU are well known (European Commission, 2006, 2007). The International Monetary Fund (2009) clearly states that the major threat to the fiscal solvency of the advanced economies is still represented by the current demographic trends. In this framework, the EU Economic and Financial Affairs[3] Council (ECOFIN) gives mandate to the Economic Policy Committee[4] to produce economic and budgetary projections for all the EU Member States on the basis of population projections by Eurostat.

The present paper provides a brief overview of the assumptions, methodology and main results of EUROPOP2008. For sake of brevity, data on Switzerland and Norway are not reported here and all results refer only to the set of EU Member States. The methodology and the assumptions were first presented to the experts of the Member States in November 2007 (Lanzieri, 2007) and then further developed (Lanzieri, 2008a) to produce the final data released in March 2008. First summary results have been presented by Lanzieri (2008b) and Giannakouris (2008), together

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[1] Since the Eighties, the European Commission issues population projections at national and regional level for the Member States of the European Union. See, among others, van der Gaar *et al.* (1999), Rees *et al.* (2001) and Lanzieri (2005, 2006).

[2] The European Union is composed of 27 independent sovereign states which are known as Member States: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), the Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), the Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), and the United Kingdom (UK).

[3] The Economic and Finance Affairs Council (ECOFIN) Council is composed of the Economics and Finance Ministers of the EU Member States.

[4] The Economic Policy Committee (EPC) is made up of representatives of the Member States and contributes to the work of the Economic and Monetary Affairs Council as regards the coordination of Member State and Community economic policies. The EPC also provides the European Commission and the Council of the European Union with advice in this area, focusing particularly on structural reforms.

with further analysis on the impact of immigration assumptions (Lanzieri, 2008c). A detailed presentation of the methodology and results is in Lanzieri (2009). EUROPOP2008 data on results and assumptions are freely disseminated by single year, single age and sex in the Eurostat database[5].

2. DATA AND METHOD

Building a database with comparable demographic data on 29 countries (the 27 Member States of the EU plus Norway and Switzerland) may be a real challenge. Although Eurostat regularly collects and disseminates demographic data from most of the European countries, gaps and inconsistencies may affect past data, and latest data may be unavailable at the time of the exercise. The data used for the projections are thus mainly national data as provided to Eurostat (freely available in the database of Eurostat), complemented by data from the Human Mortality Database[6] and personal estimates. In particular, data for France refer to Metropolitan France (FX), thus excluding the French Overseas Departments (DOM), data for Cyprus refer to the government-controlled area from 1974 and data for Germany always includes East Germany.

The methodology is based on the well known cohort-component approach, which requires the formulation of assumptions on fertility, mortality and migration. In the following chapters, it is given a brief description of the conceptual framework of EUROPOP2008 and the way how the quantitative assumptions have been calculated.

2.1. The Convergence scenario

Convergence is a concept which is central to many EU policies. For instance, the Structural Funds, among the most important EU funding, have as first purpose to narrow the gap between the development levels of the various EU regions (so-called "Convergence" objective), improving their social cohesion and economic well-being. Convergence is therefore a natural conceptual framework for assumptions setting in the context of the European Union.

The convergence is sometimes interpreted in the framework of First and Second Demographic Transitions. The former theory explains the fall of mortality first and fertility after to lower levels; the latter focus on fertility and family changes on a wider social and cultural context. Thus, whilst the engine of the First Demographic Transition (FDT) is mortality, the engine of the Second Demographic Transition (SDT) is fertility (van de Kaa, 2004). The FDT theory is commonly accepted in the scientific literature, while the contribution of the SDT to the understanding of the demographic changes is still questioned (e.g., Coleman, 2004). For instance, countries showing a demographic behaviour along the lines of the SDT are expected to have a lower fertility rate, which is instead contradicted by some empirical evidences. However, the SDT does not specify on which below-replacement level fertility is going to stay or the differentiating factors in the countries (Bernhardt, 2004).

On a global scale, convergence is substantial for both fertility and mortality (Wilson, 2001; Dorius, 2008); whether this is also the case on regional scale is probably still matter of discussion. The EU Member States are considered to have already gone through the FDT and, moreover, all of them now have period fertility below the replacement level; the question is now whether their demographic behaviour will converge to a common standard as set by the societies considered more advanced in the SDT.

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[5] http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

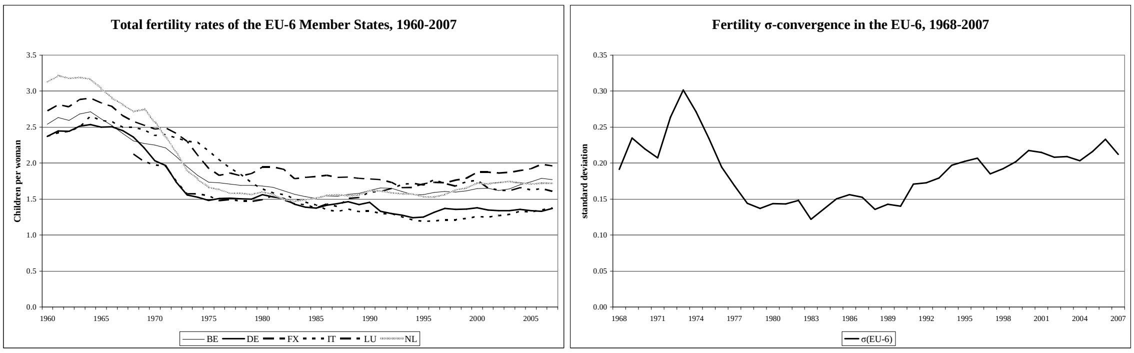
[6] Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). Available at www.mortality.org or www.humanmortality.de .

It could be thought that the membership to the EU would contribute to the spread of the demographic drivers characterising the Member States into the new adherent country(ies), in fact implying a convergence towards EU values. This EU-scale convergence could be imagined as a weaker version of the convergence of regions within a country. To assess this hypothesis in the context of the EU, the convergence is measured here not only among the set of single countries, but also including an aggregate representing the EU before the accession of the newcomer countries, that are supposed to converge to the EU values.

The convergence assumption has thus been assessed on past trends of fertility and mortality. For sake of brevity, in the present paper is reported only the analysis based on the concept of σ-convergence applied to the total fertility rate (TFR); according to this method, a reduction of the standard deviation means convergence, and vice versa. To verify if this hypothesis held in the past, the attention has been focussed on the various enlargements of the EU, looking for empirical evidences supporting the assumption of convergence between Member States especially after the accession to the EU. In the following, EU-6 refers to the European Union composed by six Member States, EU-9 to the EU with 9 Member States, and so on. In total, three out of six enlargements are taken into account, as the latest two took place too recently to see any impact on the demographic trends of the newcomers, and two enlargements have in fact been aggregated for sake of simplicity (Greece in 1981 together with Spain and Portugal in 1986).

The TFR of the six founding countries of the EU-6 (Belgium, Germany, France, Italy, Luxembourg and the Netherlands) are shown in the left panel of the Figure 1.

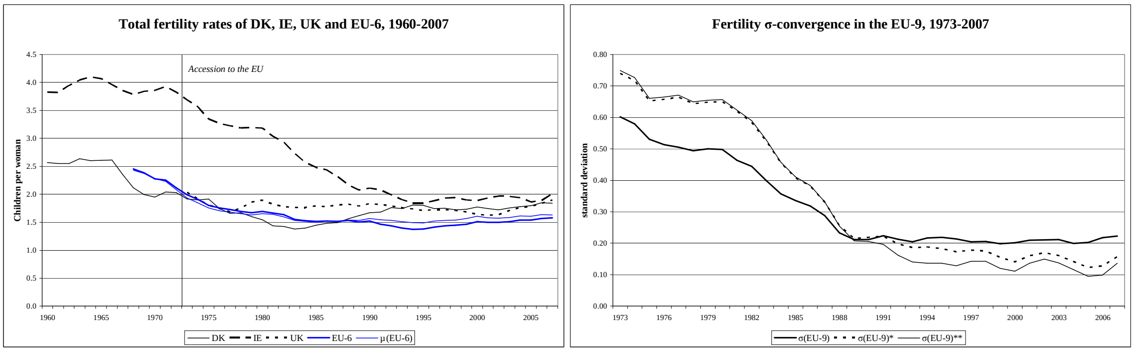
Figure 1: fertility convergence in the EU-6



Here the data on fertility show a sort of "moving together" rather than a constant convergence along the time. Their standard deviation goes down to 0.12 in 1983 from a peak of 0.30 reached ten years earlier (see right panel of Figure 1); afterwards, there is a slow recovery to values around 0.22 or anyway below 0.25. If convergence/divergence is indicated by the decrease/increase of the standard deviation, then strictly speaking there seems not to be conclusive evidence over a time span of 40 years for these six countries. Data could be interpreted either as a period of convergence followed by a slight divergence, or as long-term fluctuations around an average variability of around 0.2.

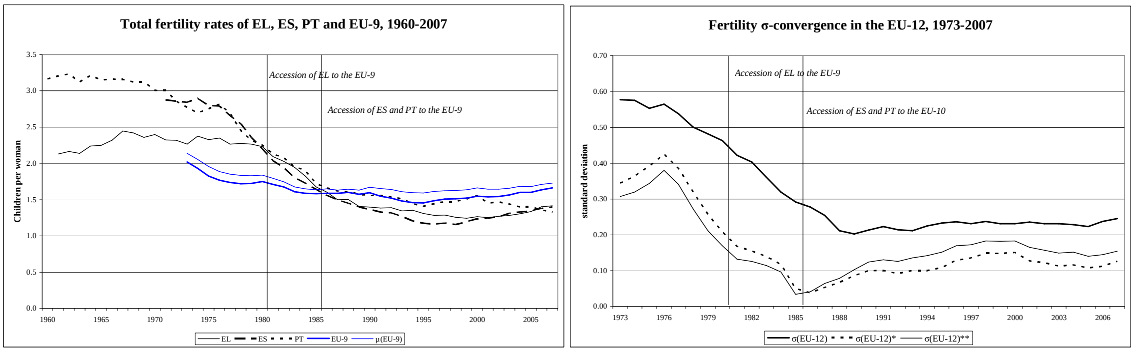
In 1973, Denmark, Ireland and the United Kingdom joined the EU. Three measures of σ-convergence have been calculated. The first is the usual standard deviation σ among the nine Member States (the six founding Members plus the three newcomers of the first enlargement); the second and the third measure consider the EU-6 Member States as one single entity (EU-6, indeed) and the convergence is calculated between the three new Members and the "common" EU-6 fertility values. These latter measures should help to assess the convergence to EU values following the membership, disentangling it from the effects of the convergence among the "older" (in terms of membership to the EU) Member States. In particular, σ* is calculated considering the EU value of the TFR, thus taking into account the population and births size of the countries, while σ** uses the average TFR across "older" Member States as EU value (indicated by μ(EU) followed by the number of Member States), thus removing the influence of the countries size on the aggregated TFR. All the three measures show in the right panel of Figure 2 a remarkable reduction of the standard deviations from the year of the accession to the EU to 1989, after which they became mostly stable around a level below 0.22. Looking at the left panel of the same Figure it is clear that such drop is mostly due to the falling of the Irish TFR.

Figure 2: fertility convergence in the EU-9



In 1981 was the turn of Greece to join the EU, followed in 1986 by other two Mediterranean countries, Spain and Portugal. Considering together these two enlargements, in the left panel of Figure 3 it can be noted the fall of the total fertility rates of Spain and Portugal and, starting in 1981, of Greece as well. After the accession of the former two countries, the TFR remains mostly stable for Portugal and similar to the EU-9 values (apart the latest years), while it follows a U-path for Greece and Spain.

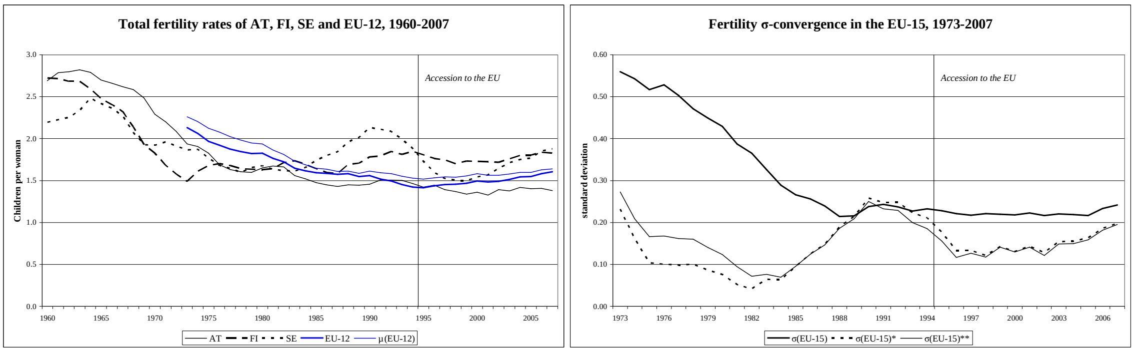
Figure 3: fertility convergence in the EU-12



The three measures of σ-convergence all catch this move downwards the EU values, but to a different extent. The common σ(EU-12), measuring the standard deviation of the TFR among the 12 Member States, falls of nearly 2/3 in 15 years, and then it remains stably around an average of 0.22 and anyway below 0.25 in the latest two decades. Considering instead the deviation from the EU aggregated TFR, either population-weighted or country-weighted, the values of the respective measures σ(EU-12)* and σ(EU-12)** are much lower, falling in the period 1981-86 below 0.05, then raising to values similar or higher than in the first accession year (1981) and finally becoming mostly stable, but never trespassing the value of 0.20. Therefore, according σ(EU-12), there has been a period of convergence, followed by a period of stability, while according σ(EU-12)* and σ(EU-12)** after a shorter period of convergence has followed a 15-year period of divergence and finally of stability.

The last EU enlargement taken into account is the one of Austria, Finland and Sweden, which all joined the EU in 1995. Before the accession, the TFR of Austria is constantly below the EU-12 average (Figure 4, left panel), while the two Nordic countries cross it in the Eighties and then remains above. After joining the EU, the TFRs of Austria and Finland remain substantially stable on their level, while the TFR of Sweden continue to converge to the EU-12 values and then it diverges from them.

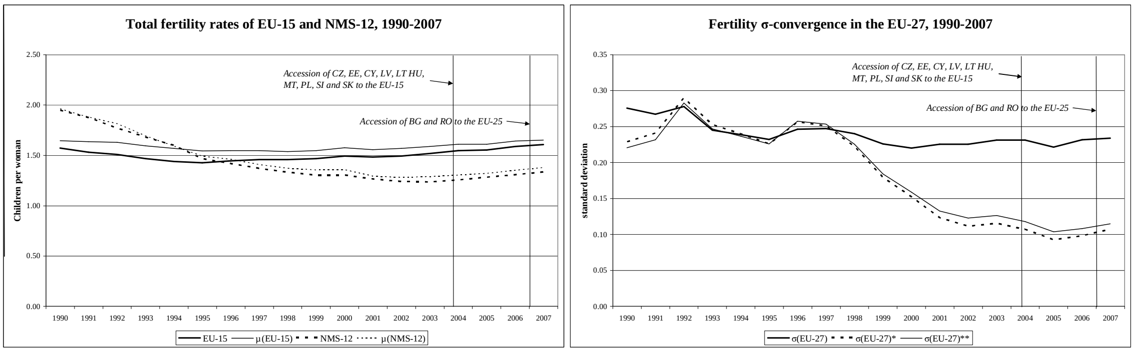
Figure 4: fertility convergence in the EU-15



After the accession, the measure of σ-convergence based on all the EU-15 Member States remains stable below the value of 0.25, around an average of 0.22; the other two measures, instead, show a recent divergence from the EU-12 values, as expected due to the TFR increase of Sweden, but still below 0.20 (right panel of Figure 4). However, the time window may be here already too short to see any factual long-term tendency.

The last information on fertility convergence is on the total of the EU-27 Member States. The accession to the EU for Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia took place in May 2004 and that for Bulgaria and Romania in January 2007. These New Member States (NMS-12) show both an aggregated TFR and an average TFR just below 2.0 children per woman in 1990, progressively falling towards the values of the EU-15 Member States and crossing them in the middle of the Nineties, and then finally moving together since the beginning of the new century (Figure 5, left panel).

Figure 5: fertility convergence in the EU-27



Although not strictly applied to the EU membership period, it is interesting to analyse the trends of the measures of σ-convergence (right panel of Figure 5). The measure σ(EU-27), which is based on the national TFR of each of the 27 Member States, reports a soft decline in the Nineties and then stable values around 0.22-0.23 since 2000. The measure σ(EU-27)*, that replaces the individual national TFR values for the EU-15 Member States with the aggregated EU-15 TFR while leaving the national TFR for the NMS-12 countries, shows a remarkable drop in a few years and then a stability around very low levels; similar pattern has σ(EU-27)**, that instead of the EU-15 aggregate uses the EU-15 average TFR.

For sake of simplicity, the analysis is not replicated here on mortality, and I simply report the total life expectancy at birth and two measures of σ-convergence, σ(EU) and σ(EU)**, thus the one based on the standard deviation on all the Member States and the one using the simple average μ(EU) of the "older" Member States as aggregated value of the EU before the accession of the newcomers. Their trends are shown from Figure 6 to Figure 10, which can be analysed following the same approach. The convergence is here more sustained, although in some cases mostly due to the path of one specific country (e.g., see the paths of Portugal and Sweden). Still, it may be controversial if it is really matter of convergence, or if instead it is just the crossing of different paths that will lead in a later moment in time to divergence (e.g., see the paths of Denmark vs. μ(EU-6), or Greece vs. Spain), depending on the time window of the observation. More details on fertility and mortality convergence analysis can be found in Lanzieri (2009).

Figure 6: mortality convergence in the EU-6

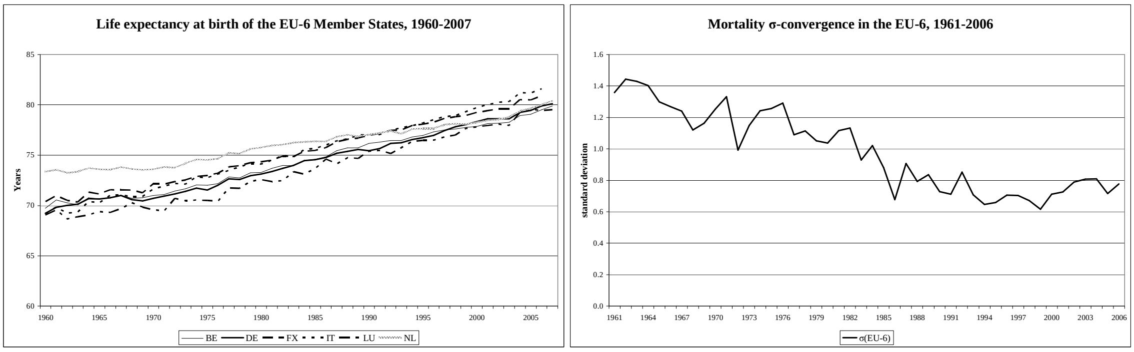


Figure 7: mortality convergence in the EU-9

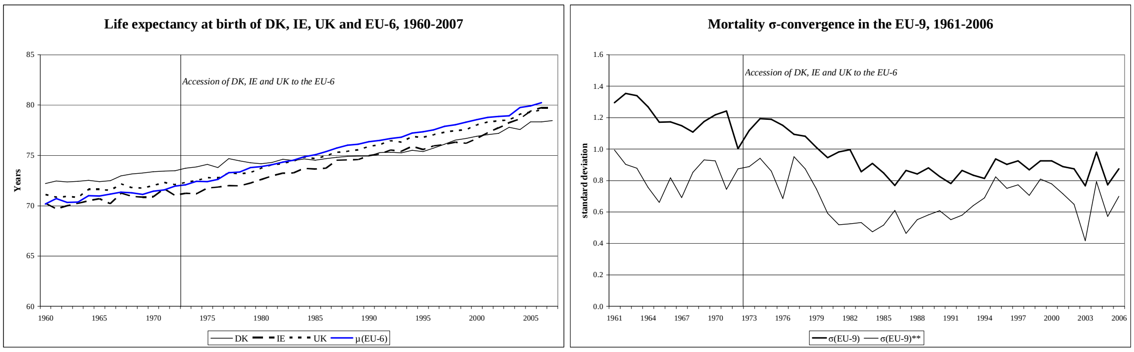


Figure 8: mortality convergence in the EU-12

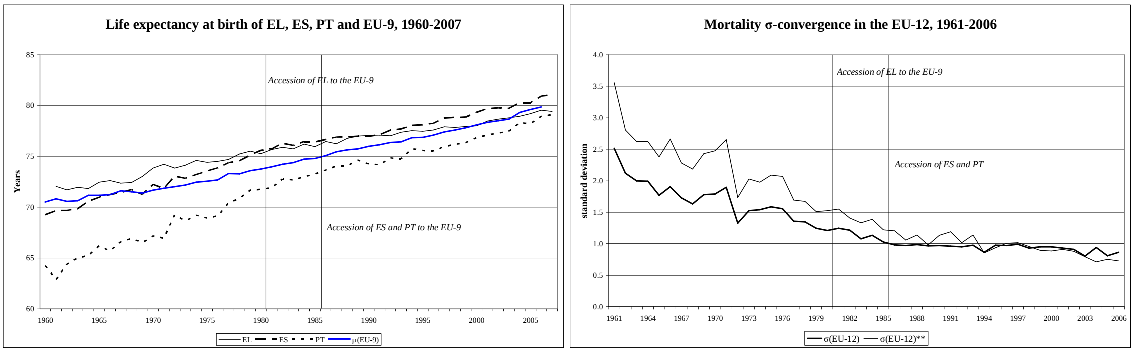


Figure 9: mortality convergence in the EU-15

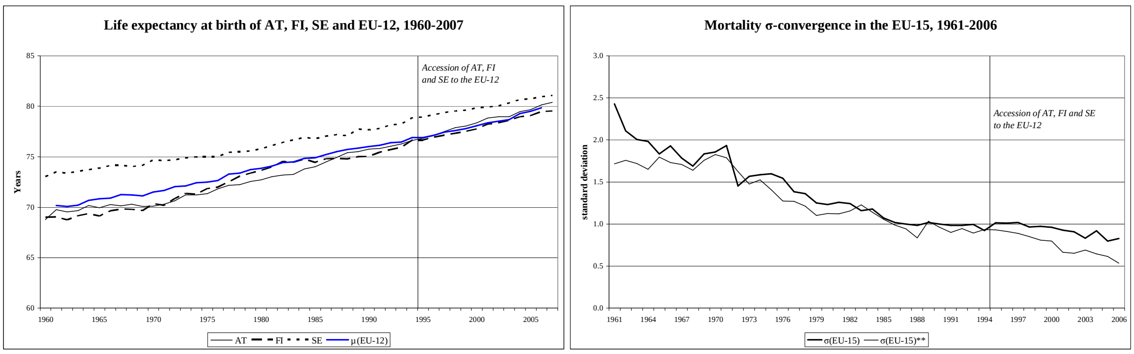


Figure 10: mortality convergence in the EU-27

Therefore, there is not conclusive full evidence that the membership to the EU would bring (additional) impulse to the convergence of fertility and mortality towards common EU values. Even when convergence seems to take place, past experiences show that this may well be just the continuation of trends appearing already before the accession. However, although the results on past values are not convincingly supporting the assumption on convergence to EU standards, there are some arguments in favour of the adoption of this hypothesis.

First of all, there is now a larger awareness of the implications of the demographic trends and therefore a greater attention by the policy-makers. Reconciliation of family and work, active ageing, etc. are examples of domains in which new impulse has been given[7]. In particular, the EU heads of state and government decided in 2007 the establishment of a European Alliance for Families that will serve as a platform for the exchange of views and experience on family-friendly policies and good practices between Member States. The spreading of best practices in the policies trying to influence the demography of the Member States could thus become more effective than in the past.

Moreover, longer time windows may be necessary to identify relevant long-term convergence trends following the EU accession. For the first enlargements, 34 years of observations are available, but they become not more than 26 for the second and only 12 years for the last enlargement taken into consideration. This may be necessary especially in the cases of crossing to make a clear distinction between short-term fluctuations around average and long-term diverging/converging tendencies.

Last but not least, the variability may be already so low that further reductions may be difficult to achieve. For instance, the level of 0.25 seems empirically to be a sort of threshold in fertility variability among countries, like 1.0 for mortality. Whether convergence is considered towards an EU aggregate, then this limit could be even lower. Once below these empirical thresholds, the countries could be considered to have achieved – at least partially – the convergence.

On the basis of the considerations above, convergence is regarded as a plausible scenario within the EU. The main assumption for EUROPOP2008 is therefore that the socio-economic differences between Member States of the European Union will fade out in the long run. The idea of convergence is not new in population projections and relevant examples are in United Nations (2004a, 2006 and 2007) and in de Beer and van Wissen (1999). However, in the former,

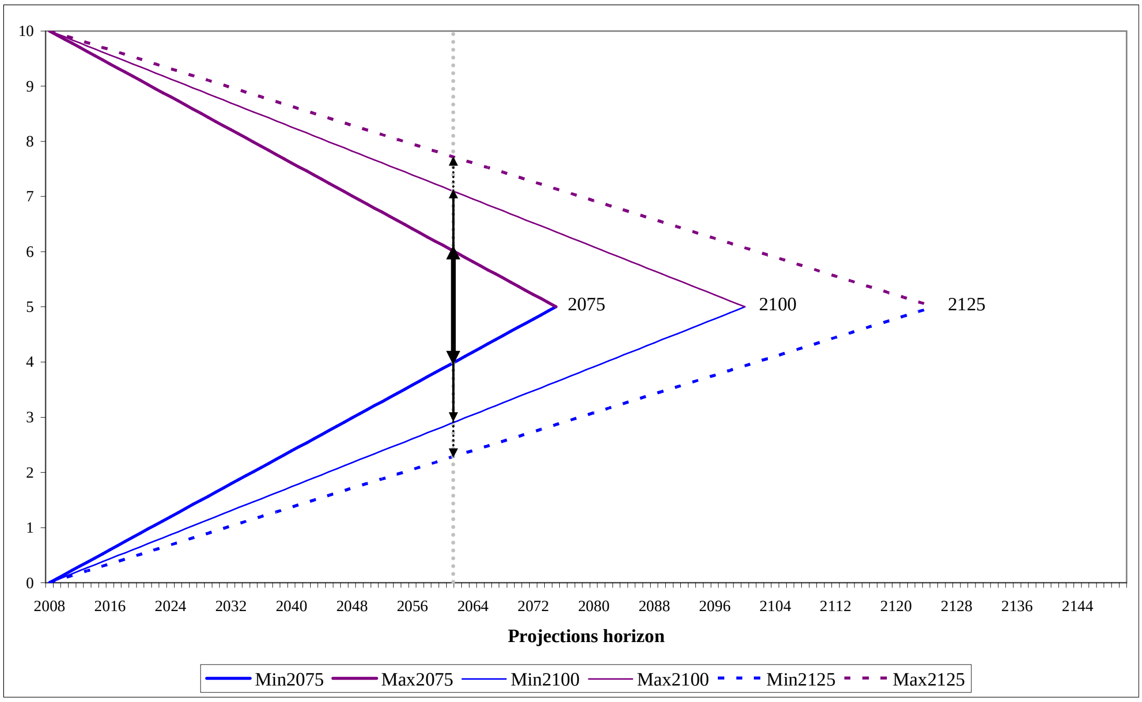
[7] The European Commission has identified five key areas to tackle the demographic change: 1) creating the right conditions for Europe's demographic renewal by giving more support to families and potential parents and by promoting greater gender equality; 2) making full use of Europe's human resources potential, notably through active ageing; 3) boosting productivity and facilitating the adaptation of our economy to the changing needs of an ageing society; 4) receiving and integrating migrants into our labour market and society; 5) safeguarding sound public finances and hence the long-term sustainability of social protection systems (European Commission, 2007, 2009).

convergence concerns only fertility, while in the latter (and partially in the former too) there is a full achievement of such convergence within the time horizon of the projections (Uniformity scenario). In the Eurostat scenario, instead, the convergence is intended as a moving towards a point in the distant future, representing a theoretical full convergence which in fact is far from being reached within the time horizon of EUROPOP2008. The idea of projections looking very far in the future is not new either (e.g., United Nations, 2004b; NIPSSR, 2002). Dealing with such long term horizons makes it necessary to adopt an approach based on scenarios. Forecasts are inherently uncertain, and especially in the long run it would be unrealistic to give them more than the meaning of just one of the possible future population developments. Very long-term population developments are thus clearly a matter of scenarios.

Having adopted the conceptual framework described above, the methodology consisted essentially of setting EU values for the convergence year (hereinafter "*convergence values*"), and of appropriately interpolating from the starting values for each country. The national values (hereinafter "*target values*") for the target year (2060) are thus automatically obtained.

The convergence year has been fixed in 2150. Moving the convergence year forwards or backwards obviously affects the national values obtained in 2060, respectively widening or narrowing their range. For instance, in Figure 11 it is represented the case of a hypothetical linear convergence to different years (2075, 2100 and 2125) and the vertical dotted gray line represents the situation in 2060: it can there be seen how the choice of the convergence year affects the range of values in 2060, progressively enlarged as moving from 2075 to 2125. This opens the possibility of building variants based on different convergence years. The common approach to present uncertainty in scenario-based projections is to produce variants, intended as combination of different levels of the demographic assumptions within the defined conceptual framework. For the Convergence scenario, an easy way, coherent with the overall approach, would be to anticipate or postpone the convergence year. This would have the effect of narrowing or enlarging the range of assumptions between countries, correspondingly to a faster or slower convergence.

Figure 11: Example of impact of different convergence years



It should be clear that the full convergence in a given year is simply a technical mean to ensure partial convergence between countries in any intermediate year. If such a full convergence was believed to be achieved by the given year, then the time horizon covered by the projections should have been extended until then. In other words, stopping the projections in an intermediate year means that the countries are supposed to converge to the range identified in that target year, but nothing is assumed on the path afterwards.

The convergence year is not the only element influencing the results in the target year. Being the values in 2060 derived from interpolations between the starting values in 2007 and the values in the convergence year, changes in the latter values will affect the values in 2060 for all countries, while changes in the starting values will concern only the specific country. National peculiarities are thus taken into account working on the starting values, while international consistency is ensured by working on the convergence values.

The impact of the key drivers on each demographic component under the general assumption of their convergence on EU scale will be briefly described in the following sections, together with the method for the quantitative estimation of the assumptions.

2.2. Assumptions on fertility

The low levels of fertility recorded in these latest years in many European countries makes very uncertain the identification of its future developments: "*existing theory is of little help in projecting future trends in the quantum of fertility*" (Bongaarts, 2002); and: "*so far the social sciences have not produced a plausible theory of fertility that would have predictive power*" (Lutz *et al.*, 2006). It is however well known that period fertility measures are affected by *tempo* effects which bias the measure of the true level (*quantum*) of fertility (Bongaarts and Feeney, 1998, 2000; Van Imhoff and Keilman, 2000; Kohler and Ortega, 2002). Scholars explain that these observed low levels are partly due to a bias induced by a general trend of postponement of childbearing which depresses the period total fertility rate (TFR).

It is indeed commonly acknowledged that the European countries are going through a process of postponement of childbearing, this being one of the causes of their low period TFR. Northern countries are supposed to be at the last stage – if not already completed - of this process, while the other Member States are seen to be at earlier stages (de Beer, 2006a). According to Billari *et al.* (2006), the driving forces of this postponement can be related to the more general ideational changes described in the SDT, to the rise of education of women and to the uncertainty during policy changes (for instance, for the central and eastern European countries).

A central point is therefore whether the observed low levels are due to the postponement (timing) of childbearing or to a change in the quantum of fertility. If the timing were the only (or main) cause, then the progressive catching-up of the births at older ages would cause a relevant (and maybe also steep) increase of the TFR. To what extent this recuperation of childbearing at older ages will actually take place is instead still much matter of discussion. Postponement can have obvious consequences on the ultimate fertility[8] (decline of fecundity with age, less time to achieve the desired family size, etc.), and it seems to be still far from its upper limit (Goldstein, 2006). However, there is a more or less shared opinion that fertility in the European countries will rise, but not to replacement level (e.g., Bongaarts, 2002; de Beer, 2006a), even if others believe in a continuation of the fertility decline (e.g., Freijka and Sardon, 2006) and pinpoint the plausibility of the *low fertility trap*, i.e. the risk that fertility will not raise from the current low levels due to a combination of declining number of births, adapted ideals of family size and decreasing relative income (Lutz *et al.*, 2006). Policies are thus called for to facilitate upturns in fertility trends and/or to prevent downward spirals (d'Addio and d'Ercole, 2005; Sanchez-Barricarte and Fernandez-Carro, 2007). Government policies do appear to make a difference

[8] Beets (2006) estimates that 1 year of increase in the mean age at first childbearing increases of 5 percentage points the overall childlessness in the same birth cohort.

(PRB, 2004), and they can try to influence either the timing of the childbearing (i.e., stopping the postponement process) or the recuperation at older ages.

Following the overall assumption of socio-economic convergence of the Member States of the European Union, it is assumed that improving economic conditions will require a stronger participation of women in the labour market, supported also by an increase of their educational level. However, this will not have a negative impact on fertility, as government policies will be put in place to facilitate the achievement of the desired family size and the reconciliation of family and work. The spread of gender equality values will also help women to combine motherhood and job, showing to younger cohorts that self-realisation on the work and larger family size can well go together. Still, the postponement of childbearing, due to longer education periods and persisting individualism, may hamper the complete catching-up at older ages and therefore the fulfilment of childbearing intentions, even if the potential infecundity will partially be counterbalanced by developments in Assisted Reproductive Technology. The growth of prosperity will also reduce the feelings of uncertainty and declines in relative income which could otherwise act as negative factors for fertility, avoiding the low-fertility trap. Finally, the increasing number of migrants will have a positive effect on the fertility level, even under the assumption of a quick convergence to the local demographic behaviour as their age structure is younger than the one of the hosting population.

The fertility age patterns have been modelled using the method proposed by Schmertmann (2003) and the software he has made available (Schmertmann, 2005). This kind of model, based on piecewise quadratic splines, has proved to be quite performing[9] and allows managing both level and shape of fertility. The Schmertmann model describes the shape of the age fertility rates using only three parameters: the youngest age α at which fertility rises above zero, the age P at which fertility reaches its peak level and the youngest age H above P at which fertility falls to half of its peak level. Schmertmann (2003) also proposes two indexes: the "delay" D in achieving peak fertility (D=P–20) and the "stopping" S, i.e. an index of post-peak fertility (S=(P+50)/2-H), being in fact H the halfway point after the peak level of the age distribution. Based on the analysis the age patterns estimated for each Member State, the values for the parameters of the Schmertmann model have been set as follows: $\alpha = 14$, i.e. women start to give birth from age 14; P = 31, i.e. the peak of fertility is at age 31.0, more than the EU average; H = 37, i.e. one year and half more than the EU average.

Such values of the parameters gives TFR=1.85, the delay D is equal to 11 years and the stopping S is equal to 3.5 years (instead of 4.6, current EU average), measures indicating a postponement of childbearing. This age pattern has been assumed to be the common EU distribution of fertility rates in the convergence year. The fertility distributions and the resulting TFR for each Member State in the target year has thus been obtained by means of a linear interpolation from the latest observed distributions and the convergence values in 2150. In Figure 12 are presented the fertility distributions at intermediate years for Bulgaria, showing how the convergence towards the common EU distribution in 2150 defines the fertility pattern in the target year 2060.

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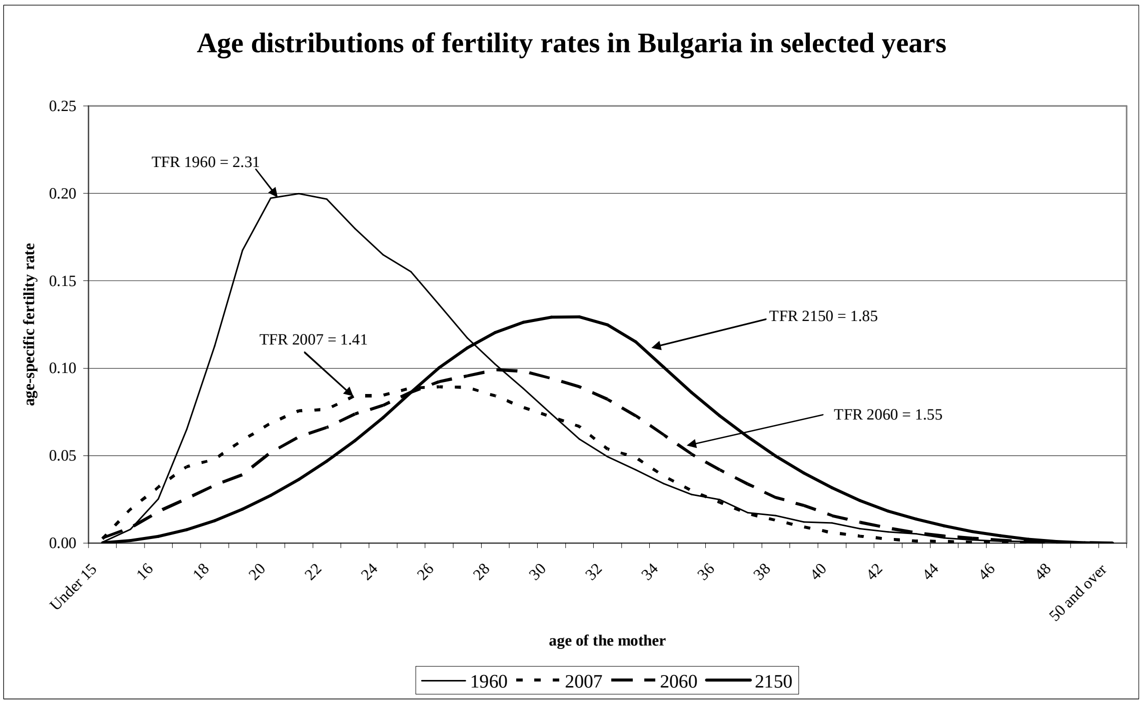
9 In some countries (mostly Anglo-Saxon) it has appeared a bulge in the fertility rates at younger ages. As this is a pattern only recently emerged and concerning a restricted set of countries, it has not been considered relevant for the EU common standard. Therefore, other models proposed to deal specifically with this issue (e.g., Peristera and Kostaki, 2007) have not been adopted. The relative error of the Schmertmann model for this kind of unusual distribution was 9.3% for UK and 7.2% for IE, both in 2006, with an average relative error for the EU Member States of 6.2%.

Figure 12: example of quantitative assumptions on the evolution of fertility



On average across the EU Member States, therefore, the TFR is assumed to rise by 0.11 points from 2007 to 2060. The more relevant increases are for the countries which are currently at very low levels of fertility, as the socio-economic and cultural drivers are supposed to be there more influenced by the overall process of convergence towards common values. The spread of cultural values and the impact of government policies are thus assumed to be more effective in those countries whose fertility behaviour is more "distant" from the best performers. Additional improvements in countries already near to the best performers are instead more difficult to obtain, and their increases in TFR are less relevant. Countries currently above the target values are assumed to converge too to the common values, as the spread of values like individualism and post-materialism may affect their relatively high period fertility rates; overall, this is equivalent to assume that these countries will complete their second demographic transition settling down the TFR at the convergence value.

The convergence value of the TFR is in fact equal to its current level in Sweden. This country is indeed considered, in the context of the SDT, to be probably the furthest of the countries (Bernhardt and Goldscheier, 2006). Experience from this country shows how it is possible to conciliate work and family with the support of government policies and in a cultural framework of gender equality (Hoem, 2005). Sweden is thus supposed to have completed its transition process and to be the reference for the countries which are now at different stages of the SDT.

A comparison of the mean ideal family size as expressed by samples of women in the Eurobarometer surveys in 2001 and 2006 (Testa, 2002, 2006) shows no changes in practice in these 5 years in the EU-15 total, and an average value of 2.36 for the EU-27 in 2006. Certainly this value should not be taken as such for the purpose of forecasting fertility (van Hoorn and Keilman, 1997), and plenty of factors may intervene impeding the achievement of the desired family size, but still this may be an indicator of potential increase for fertility. However, the diffusion of individualist and post-materialist values and the further postponement of childbearing will probably constrain the fertility below the replacement level.

2.3. Assumptions on mortality

There is little doubt that improvements in mortality will continue in the coming years; however, there is still much debate on the extent of these improvements (Garssen, 2006). Some scholars assert the existence of a biological limit to the human life (e.g., Carnes and Olshansky, 2007); others see a linear increase of the life expectancy at birth (e.g., Oeppen and Vaupel, 2002; White, 2002).

In the framework of the Convergence scenario, economic conditions are supposed to have improved in all the European Union. Health technologies are spread all across the Member States, and residents in an EU country have the legal and economic possibility to be treated and cured in any other Member State. Advanced medical techniques too will be progressively accessible in each country to the same degree, thanks to growth in prosperity. As the importance of healthy lifestyles will be more and more acknowledged, best behaviours will be proposed as models, and actions will be undertaken to favour their adoption. Information on relevant health factors like smoking, nutrition, physical activity, etc. will be homogeneously spread in Europe and lifestyles will progressively adapt. The improvement of the economy will bring its positive effect especially on men, usually more sensitive to changes in the economic conditions, narrowing the distance from the female life expectancy. As women will be increasingly participating to the economy of the countries and gender equality values will be more common, the reduced difference between male and female life expectancy will also be due to the tendency of smaller gender differences in the lifestyles.

Countries that are currently lagging behind in terms of life expectancy will be the ones to benefit most from these developments. These countries will have the opportunity to benefit immediately of medical knowledge already available, and they will be more and more aware of the importance of prevention and healthy lifestyles already common in other European countries. Therefore, the pace of mortality improvements will be different, depending on the starting level on the country, and the increase in life expectancy will be as relevant as large are the differences with the best performers.

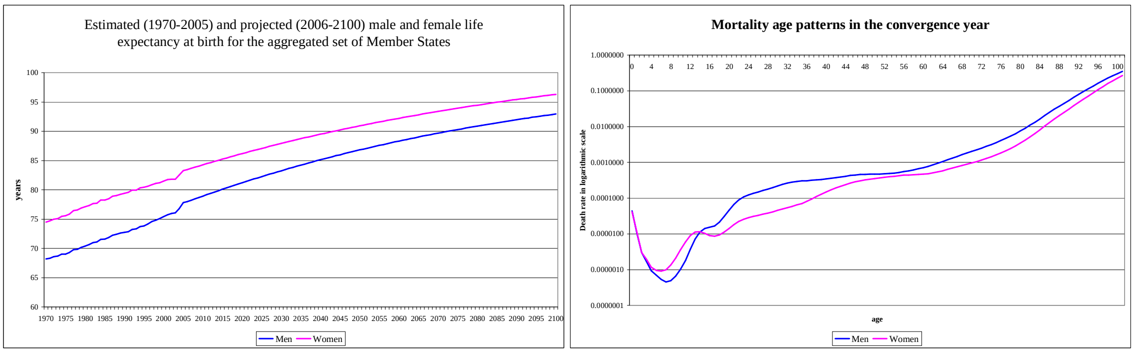
However, improvements for countries with already low level of mortality should not be over-optimistic. As, at the current stage, it is largely unknown which of the two main ways of thinking (optimistic or pessimistic) in fact holds, it can be cautiously assumed that improvements for forerunners will take place to a slowing pace. This position is somewhere in the middle between the acknowledgement of the existence of a biological limit and the linear future increase of life expectancy, and it is consistent with the most recent empirical evidence. In fact, further improvements can only be expected from the older ages, as the current levels for infant mortality do not leave much margin of gain. Mortality at young or middle age will be reduced thanks to improved legislations on safety at work and against road accidents, based on the experience of the best performing countries, but the overall gain for the forerunners will be limited. Thus, looking at the causes of death, progress will be most likely obtained against chronic diseases such as cardiovascular disease and cancer, currently the most important causes of death. Further gain can derive from the development of advanced medical techniques based on genetics. Substantial increases in life expectancy can be achieved only by means of strong reductions in mortality rates, even if at a slower pace than observed in the past (de Beer, 2006b); empirical analysis show that these considerable declines in old-age mortality may be expected (Janssen *et al.*, 2007). However, linear improvements for countries with low mortality can be assumed only for the senescent component, as juvenile and background mortality are already at very low levels, and thus the life expectancy at birth should rise more slowly in the future decades (Bongaarts, 2006). The increasing number of migrants, coming from countries with lower life expectancy, will also play a role in the reduction of the pace of mortality improvements, even if this effect will probably become visible only when the bulk of migrants will reach older ages.

Therefore, the reduction of socio-economic differentials between countries will bring a convergence of the mortality to the levels of the best performers. These latter are assumed to slow down their pace of mortality improvements. As in the past several crossovers of life expectancies have been observed between countries (e.g., the Netherlands and Denmark have fallen down from their high ranks in the Eighties), the best performers will be identified by a larger group than the one currently with the higher life expectancy. This convergence to the set of best performer countries can easily be expressed in form of convergence to common rates in the far future. Indeed, the epidemiologic transition theory, further extended in the health transition theory, explains that all countries go through various phases, even if in different times and extent, and future developments can be seen as leading to common mortality patterns, as the prevailing causes of death may tend to be similar (Vallin and Meslé, 2004; Meslé, 2004).

In order to set the values of the males and females life expectancy and the corresponding death rates in the convergence year, the BMS variant of the Lee-Carter model (Booth et al., 2002) has been applied[10] to the aggregated data of a set of twelve Member States (BE, DK, DE, ES, FX, IT, NL, AT, PT, FI, SE and UK), considered to be the set of best performer countries as a whole. According to a comparative assessment (Booth *et al.*, 2005, 2006), this variant provides slightly more accurate forecasts of life expectancy and it optimises the fitting period based on criteria of goodness-of-fit. Shorter fitting periods perform on average better than longer fitting periods, and this is true especially in the case of changing pattern of mortality decline. As future further improvements in mortality are expected, unlike in the past, only in the older age classes, the capacity to adapt to shorter fitting period is a relevant quality of the BMS variant.

The models for male and female life expectancy have been fitted over the period 1977-2005. The death rates obtained by the extrapolation to 2100 with the BMS method are the convergence values (Figure 13). The crossover between sexes in the young age classes is irrelevant in practice, as it is at very low level of mortality.

Figure 13: mortality assumptions for the convergence year



The choice of a larger set than the pure forerunners allows the avoidance of excessively high forecast values. Therefore, while it does not impose any ceiling on the increase of life expectancy, this approach is prudent in its extrapolation. In Figure 13 it can be also noted how the values for male and female life expectancy are slightly converging, respecting the empirical evidence.

The provisional target values of the death rates in 2060 are thus obtained by exponential interpolation from the smoothed latest available mortality rates to the convergence values. The target values for male and female life expectancy in 2060 are thus derived from these target death rates, with an average increase from 2007 of 9.4 years for men and 7.6 for women. Countries that are currently on lower level of mortality (thus higher life expectancy) are assumed to have the smaller increases in life expectancies, while the others will progressively benefit of the improvements already occurred to the best performers, realising relevant increases in the life expectancies. For all countries, however, improvements will occur at a slowing pace. Due to the changing national pattern of mortality (converging to the European standard in the convergence

[10] The package Demography developed by Hyndman for the software R has been used (available at: http://www.RobHyndman.info/Rlibrary/demography).

year), some light crossovers may happen between countries, as in fact has happened in the past. The sex differential is projected to narrow to 4.7 years on average.

The assumptions on fertility and mortality are summarised in the Table 1. Their standard deviation goes down in the target year 2060 to 0.14 for the TFR and to 1.6 and 1.0 for life expectancy at birth respectively for men and women, thus to values lower than in the starting year.

Table 1: fertility and mortality assumptions in EUROPOP2008

	TFR 2060	e° men 2060	e° women 2060
EU27	1.68	84.5	89.0
BE	1.79	84.4	88.9
BG	1.55	81.6	86.5
CZ	1.52	83.2	87.8
DK	1.85	84.3	88.4
DE	1.53	84.9	89.1
EE	1.66	80.8	87.5
IE	1.88	85.2	89.2
EL	1.57	84.8	88.7
ES	1.56	84.9	89.6
FX	1.93	85.1	90.1
IT	1.55	85.5	90.0
CY	1.60	85.2	88.7
LV	1.54	80.5	86.8
LT	1.54	80.4	86.9
LU	1.72	84.5	88.5
HU	1.53	81.9	87.3
MT	1.55	84.3	88.6
NL	1.77	84.9	88.9
AT	1.57	84.9	89.2
PL	1.49	82.5	88.0
PT	1.54	84.1	88.8
RO	1.52	81.9	86.6
SI	1.52	83.7	88.8
SK	1.47	82.0	87.4
FI	1.84	84.3	89.3
SE	1.85	85.4	89.3
UK	1.84	85.0	88.9

2.4. Assumptions on migration

As the socio-economic disparities are assumed to fade out in the future and thus the attractiveness of the countries to be more and more similar, the choice of a Member State as hosting country will not depend anymore on national pull factors. For the migrants, once taken the decision to migrate to the EU, it will be indifferent, from the point of view of the conditions offered, in which Member State to settle down. In this far future, all the countries are indeed assumed to have the same pull power, in terms of similar integration policies, economic conditions, welfare system, etc. Under this conceptual framework, it is plausible to assume an intra-EU migration exchange with sum equal to zero; nonetheless, this may still have an impact on the national age structures due to the different age patterns of immigrants and emigrants.

Yet, three factors may still be thought to play a diversifying role: the climate, the foreign communities' links and the ageing process. Special policy actions (like regularisations, etc.) are not considered here. There is a common belief that improved economic conditions will bring an increase in post-retirement migration. Examples in this sense are the Southern countries in the

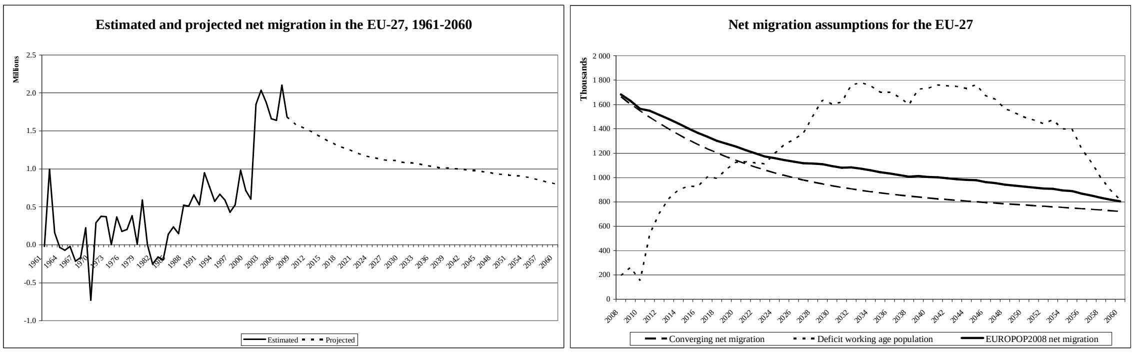
United States (Florida and California), where retired people tend to emigrate to enjoy the local better meteorological and environmental conditions. From this point of view, the Southern, Mediterranean European countries would have a competitive advantage; however, it is assumed that retired persons will maybe spend only part of their time in some other place, but they will keep as centre of their interests the country that was their residence during their working age. Even if such an EU internal move towards South would take place, it is believed it will not reach significant volumes, as many factors can – other conditions being equal - counterbalance an increasing demographic pressure in selected areas, like growing costs of living, unavailability of housing, etc.

Concerning the second factor, in accordance with the network theory, migrants will tend to move in the countries where are already settled communities to which they belong (Pedersen *et al.*, 2004). However, given the increasing number of foreign-origin resident population, in fact it is assumed that in the long run each country will have an enough large number of resident migrants for each group to be considered attractive for potential migrants. Therefore, communities of migrants are supposed to be spread across the Member States and not to be concentrated in one or few single countries.

The third element of diversification is the demographic process of ageing. This phenomenon is affecting the Member States to a different extent and speed. Even under assumptions of converging demographic values for fertility and mortality, still the ageing process will continue to differentiate countries, due to the impact of different population age structures. This factor has therefore to be taken into account in the formulation of assumptions for migration, as it is common belief that the first-hand solution to a declining working age population is an increase in immigration. An analysis to this regard has been carried out by United Nations (2001), where it was shown how the full achievement of objectives like the maintaining of the size of total populations, working-age populations and potential support ratios for selected countries was soon producing implausible values. Certainly, several other solutions are at the disposal of policy makers and economic actors to deal with working-age population shortages, like pro-fertility policies, increases in labour productivity, delocalisation of production sites, etc. Moreover, the link between the shortage of labour force and immigration can so far be applied to only specific sectors of the national economies. Nevertheless, in order to shape the future path of migration levels, it is important to take into account also the demand side, which could roughly be expressed by the deficits in the working-age populations. Last but not least, the overall assessment of the plausibility of the migration assumptions needs to take into account both the social and the economic dimension. In developed countries, the concomitance of low fertility and high immigration could have relevant consequences on the composition of the population (Coleman, 2006; Lanzieri, 2008c), calling for integration policies to face important challenges in the future. In other words, migration assumptions may not be set on very high levels for a long period, as this may turn out in less plausible results for the projected population composition by natives/migrants.

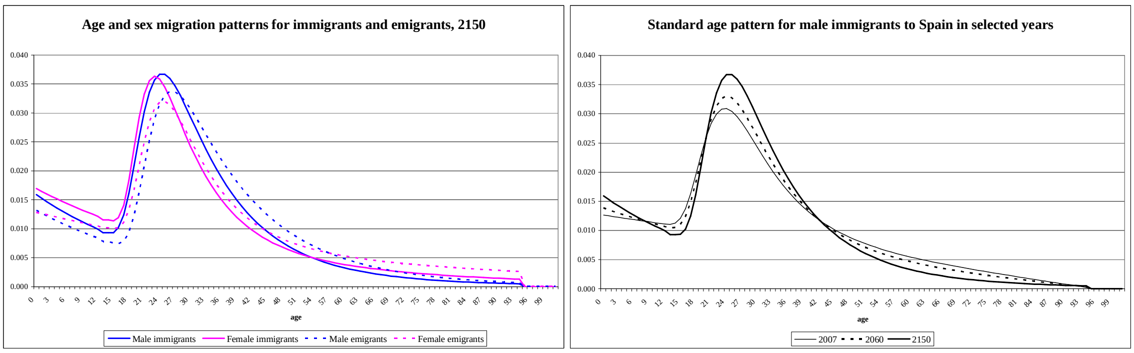
Like for the other demographic components, assumptions can easily be derived in terms of convergence to a common point. Setting this point equal to the average of immigrants and emigrants in each Member State is equivalent to assume that the net migration will converge to zero in the very long term (e.g., by 2150). From the theoretical point of view, this can be justified with the very high level of uncertainty typical of the migratory flows and the potential development of economies other than current ones. In such a situation, zero is a kind of neutral assumption and values different from it would not either be exempt from discussions about the "correct" long-term level. Moreover, two further points should be taken into account: first, the converging value is only a technical mean to ensure convergence, and the real assumptions are the target values (in 2060); second, the convergence to zero of the net migration does not include the adjustments linked to the shortages in the working-age population and therefore the total (adjusted) net migration will be anyway different from zero. Quantitative values for total migration have been thus calculated by sex for immigrant and emigrants based on the assumption of convergence to zero net migration, and partially adjusted upwards to take into account the projected deficit in the working age classes (see Figure 14 for the EU-27). Assumptions for each EU Member State are reported in Table 2. To highlight the impact on migration, a variant of the Convergence scenario has been calculated under the theoretical assumption of zero migration.

Figure 14: assumptions on migration



These values have been distributed by age according to evolving age profiles. Age standardised patterns for several countries have been modelled by means of an extensive application of the Rogers-Castro schedule (Rogers and Castro, 1981; Rogers *et al.*, 2005) with 7 parameters to the latest available migration data. An average schedule has been estimated taking the median of the distribution for each of the seven parameters of the Rogers-Castro model and for each migratory flow. The pattern identified by these average parameters is assumed to be the EU age distributions in the convergence year, as in the left panel of Figure 15. The age profiles of the males and females migrants are supposed to progressively converge to EU standards and therefore their evolution year by year is obtained by interpolation between the starting distribution and the standard patterns (see the example in the right panel of Figure 15).

Figure 15: age and sex migration patterns



3. MAIN RESULTS

The first basic outcome of the EUROPOP2008 is that the population at EU level is expected to start declining; however, this will concern the Member States to a different extent, some of them continuing a decline already started before 2008[11], others expected to start declining during the projections time window, and eight of them (Belgium, Denmark, France, Ireland, Cyprus, Luxembourg, Sweden and the United Kingdom) are projected to continue their population growth. In Table 2 are reported the vital events and the assumptions of migration for each EU Member State and for the whole EU over the projections period.

[11] See Lanzieri (2008d).

Table 2: demographic balance 1 January 2008 – 1 January 2061							
thou.	Estimated population	Cumulative births	Cumulative deaths	Natural change	Cumulative net migration	Total change	Projected population
	1.1.2008	*2008-2060*					*1.1.2061*
EU27	495 394.0	255 417.8	305 254.1	-49 836.3	59 030.9	9 194.6	504 588.6
BE	10 656.2	6 578.0	6 610.3	-32.2	1 680.4	1 648.2	12 304.4
BG	7 642.2	2 779.4	5 026.6	-2 247.1	42.7	-2 204.4	5 437.8
CZ	10 345.9	4 434.9	6 568.7	-2 133.8	1 253.5	-880.3	9 465.7
DK	5 475.8	3 385.8	3 326.2	59.5	389.3	448.8	5 924.6
DE	82 179.1	32 770.0	52 730.2	-19 960.3	8 183.3	-11 777.0	70 402.2
EE	1 338.6	631.5	842.6	-211.1	-0.9	-212.1	1 126.6
IE	4 414.8	3 857.3	2 371.7	1 485.6	868.8	2 354.4	6 769.2
EL	11 216.7	5 086.7	7 099.5	-2 012.8	1 874.7	-138.1	11 078.6
ES	45 283.3	23 571.1	28 774.7	-5 203.6	11 655.3	6 451.7	51 735.0
FX	61 875.8	41 668.6	36 048.0	5 620.7	4 375.4	9 996.1	71 871.9
IT	59 529.0	25 910.1	38 261.3	-12 351.1	11 994.1	-357.1	59 171.9
CY	794.6	595.0	465.5	129.5	402.0	531.5	1 326.1
LV	2 269.1	882.8	1 478.0	-595.2	-4.9	-600.1	1 669.0
LT	3 365.4	1 350.3	2 184.4	-834.0	-4.1	-838.1	2 527.4
LU	482.2	361.0	296.5	64.5	188.4	252.9	735.1
HU	10 045.4	4 221.8	6 598.6	-2 376.8	1 008.5	-1 368.3	8 677.1
MT	410.5	190.6	247.9	-57.4	50.4	-7.0	403.5
NL	16 404.3	9 244.2	9 589.7	-345.5	512.1	166.5	16 570.8
AT	8 334.3	4 181.4	4 990.2	-808.8	1 501.5	692.6	9 027.0
PL	38 115.6	15 119.3	22 868.9	-7 749.6	538.2	-7 211.4	30 904.2
PT	10 617.4	5 028.6	6 752.3	-1 723.7	2 346.4	622.7	11 240.1
RO	21 423.4	8 329.6	13 329.9	-5 000.3	357.1	-4 643.2	16 780.1
SI	2 022.6	829.9	1 277.7	-447.8	193.2	-254.5	1 768.1
SK	5 398.8	2 146.7	3 292.1	-1 145.4	258.3	-887.1	4 511.7
FI	5 299.8	3 053.3	3 289.6	-236.3	334.4	98.0	5 397.8
SE	9 182.9	6 011.0	5 515.3	495.7	1 211.8	1 707.5	10 890.4
UK	61 270.3	43 199.1	35 418.0	7 781.1	7 821.1	15 602.2	76 872.5

The main contribution to the population growth comes from the migration assumptions. Comparing the results of the main variant with the one without migration, it is possible to assess the (direct and indirect) impact of migration. As it can be seen from Table 3, migration contributes to the total change not only *per se*, but also indirectly via the vital events, to which the migrants, usually younger than the hosting population, obviously contribute also under the assumption that their fertility and mortality is identical to those of the hosting country. For instance, in EUROPOP2008, at EU level there are 16% of live births more if migration is taken into account.

Table 3: cumulated vital events and demographic changes 2008-2060 for the EU in the two variants (with and without migration) of EUROPOP2008						
(million)	Births	Deaths	Natural change	Net migration	Total change	Populatio n 1.1.2061
With migration	255	305	-50	59	9	505
Without migration	219	301	-82	0	-82	414
Difference	36	4	32	59	91	91

Smaller cohorts of women reaching the childbearing age and an increasing number of deaths due to the ageing of the post-war baby-boom generations are expected to produce negative natural changes. At EU level, deaths will outnumber births from 2015 onwards, but migration is assumed to counterbalance the negative natural change until 2035, year in which the population is projected to start declining, after having reached a peak of 520.7 million of persons. At national level, this process will take place at different speeds and timing. As it can be seen in Table 4, the number of years it will take to each country to start its population decline – if any – is rather different. To appreciate the contribution of migration to the population growth, the Table 4 contains also the year in which the deaths would outnumber the live births, with and without migration, in the projections period[12]. Thus, for instance, without migration Spain would have already in 2015 a negative natural change; due to migration, this natural deficit is instead postponed of 4 years, to 2019. Finally, even with a negative natural change, migration is projected continuing to support the Spanish population growth until 2045, thus for further 26 years. Some countries (IE, FX, LU and UK) will not experience a negative natural change within the time horizon of the projections, but no one is projected to keep a positive natural change without the contribution of migrants. In four countries (BE, DK, CY and SE), migration will support the population growth at least until 2060, counterbalancing their negative natural change.

[12] Greece and Sweden appear twice in the columns of the tables due to their specific paths of vital events and population, which make these two countries to have recuperation after a first negative value. The two years – specific for EL and SE - correspond then to the first year in which a negative value appears for the specific category and to the year after which the negative value is always present.

Table 4: timetable of demographic changes for the EU-27 Member States, 2008-2060			
Year of projection	Negative natural change without migration	Negative natural change	Decline total population
2008	BG, CZ, DE, EE, IT, LV, LT, HU, RO	BG, DE, EE, IT, LV, LT, HU, RO	BG, DE, EE, LV, LT, HU, PL, RO
2009	PT, SI	CZ, SI	
2010	EL, AT	PT	
2011		EL	
2012	EU-27, PL	PL	
2013	SK	SK	
2014			
2015	ES	EU-27	
2016		AT	
2017			
2018	BE, MT		
2019		ES	SI, SK
2020		MT	
2021			CZ
2022			
2023	FI		
2024			
2025		FI	
2026	LU, NL		EL
2027	SE		
2028	DK, CY		MT
2029			
2030	UK		
2031			FI
2032		NL	
2033			
2034			
2035		BE, DK	EU-27
2036		SE	EL, NL
2037			
2038			IT
2039			
2040			
2041	FX		
2042			
2043			
2044			
2045			ES, PT
2046			AT
2047			
2048			
2049			
2050			
2051			
2052			
2053	IE		
2054			
2055			
2056			
2057			
2058			
2059			
2060		CY, SE	
No until 2060		IE, FX, LU, UK	BE, DK, IE, FX, CY, LU, SE, UK

The increasing number of survivors to higher ages, combined with low fertility levels and the age structures of the populations, will push the ageing process in the EU Member States with no exceptions: therefore, the EU population is likely to decline but it is certain to age, the ageing taking place from both the top and the bottom of the age pyramids. In Table 5 are reported two measures of ageing, the proportion of persons aged 65 and over on the total population and the old age dependency ratio (OADR). With the only exception of Cyprus, the new Member States (that acceded the EU in 2004 and 2007) show a remarkable increase of the OADR. The Mediterranean countries too (Greece, Spain, Italy and Portugal) are projected to have a remarkable quota (more than 30%) of the total population aged 65 and over in 2061.

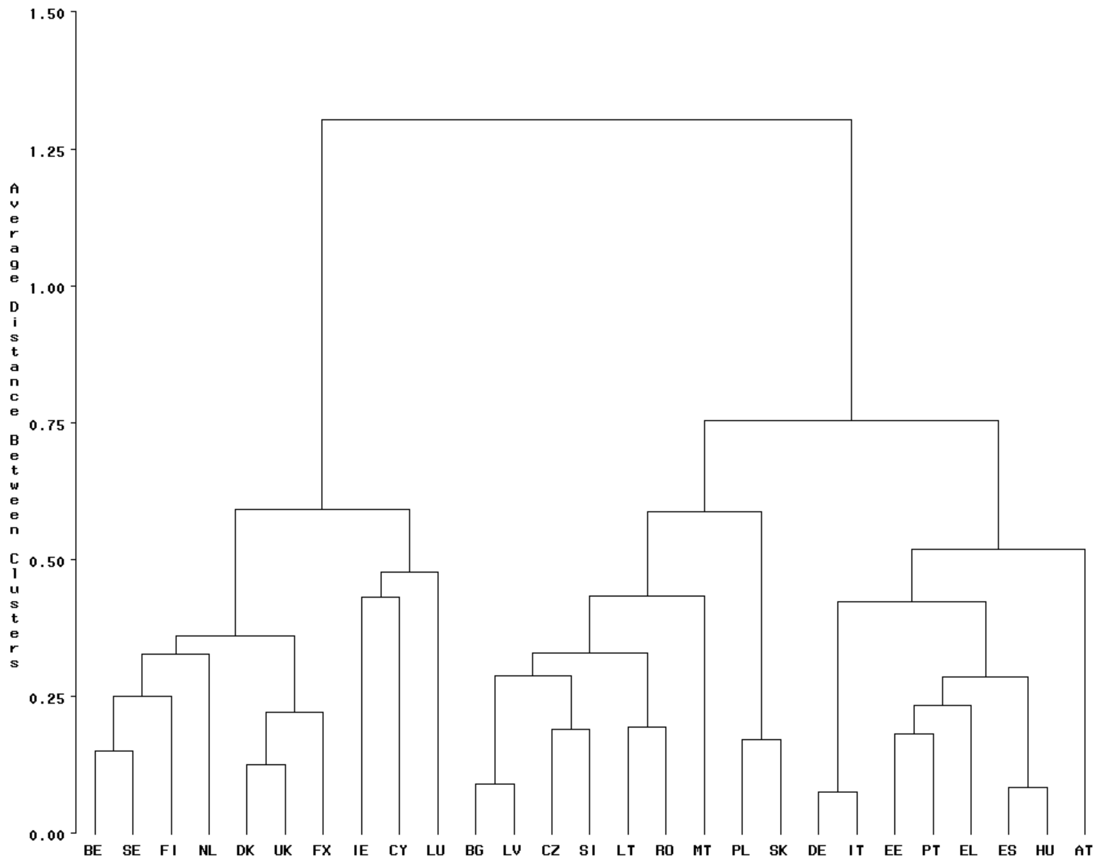
Table 5: percentage of population by major age group and old age dependency ratio at the beginning (2008) and at the end (2061) of the projections period

	Year 2008			Year 2061			OADR	OADR
	0-14	*15-64*	*65+*	*0-14*	*15-64*	*65+*	*2008*	*2061*
EU-27	15.7	67.3	17.1	14.0	56.0	30.0	0.254	0.535
BE	16.9	66.1	17.0	15.6	57.8	26.6	0.258	0.459
BG	13.4	69.3	17.3	11.9	54.0	34.1	0.250	0.632
CZ	14.3	71.1	14.6	12.2	54.5	33.3	0.206	0.612
DK	18.4	66.0	15.6	16.3	58.5	25.2	0.236	0.431
DE	13.7	66.2	20.1	12.6	54.9	32.4	0.303	0.591
EE	14.8	68.0	17.2	13.9	55.5	30.6	0.252	0.552
IE	20.4	68.4	11.2	16.9	57.9	25.2	0.163	0.435
EL	14.3	67.1	18.6	12.9	55.5	31.6	0.278	0.570
ES	14.6	68.8	16.6	12.9	54.9	32.2	0.241	0.587
FX	18.3	65.2	16.5	16.6	57.4	25.9	0.253	0.452
IT	14.0	65.9	20.1	12.1	55.2	32.7	0.305	0.592
CY	17.5	70.1	12.4	14.9	58.7	26.4	0.177	0.449
LV	13.7	69.0	17.3	12.2	53.5	34.3	0.250	0.642
LT	15.3	68.8	15.8	12.4	52.7	34.9	0.230	0.662
LU	18.2	67.7	14.2	16.2	60.2	23.7	0.209	0.394
HU	15.0	68.8	16.2	12.6	55.3	32.1	0.235	0.580
MT	16.3	69.9	13.8	12.6	54.7	32.7	0.198	0.598
NL	17.9	67.4	14.7	15.0	57.7	27.3	0.218	0.474
AT	15.3	67.5	17.2	13.8	57.2	29.0	0.254	0.508
PL	15.5	71.1	13.5	11.3	52.3	36.4	0.189	0.695
PT	15.3	67.2	17.4	12.8	56.3	30.9	0.259	0.548
RO	15.2	69.9	14.9	11.4	53.6	35.0	0.213	0.653
SI	13.9	70.0	16.1	12.8	53.9	33.4	0.230	0.619
SK	15.8	72.3	12.0	11.1	52.6	36.3	0.166	0.689
FI	16.9	66.6	16.5	15.7	56.4	27.9	0.248	0.496
SE	16.8	65.7	17.5	16.4	56.9	26.7	0.267	0.468
UK	17.5	66.4	16.1	16.5	58.6	24.8	0.243	0.424

Using the young and old age dependency ratios in 2008 and 2061 (respectively YADR and OADR), a cluster analysis has been performed to detect similarities of the age structures of the Member States at the beginning and at the end of the projections period. In Figure 16, the dendrogram showing the progressive aggregation of the countries in clusters may suggest more than one classification of the Member States. If only 3 groups are considered, obtained drawing an horizontal line at the level of 0.75 of the vertical axis, the one on the left (composed by BE, SE, FI, NL, DK, UK, FX, IE, CY and LU) is younger on average than the other two groups of countries at both the beginning and the end of the projections period; in terms of economic implications of the ageing population, these countries are thus in a more favourable (demographic) position. The second group (BG, LV, CZ, SI, LT, RO, MT, PL and SK) has a relatively young population at the beginning of the period, but suffers of a quick ageing and has on average the higher values of the OADR at the end of the period. The last major group (DE, IT, EE, PT, EL, ES, HU and AT) is instead the oldest on average in 2008 and ages considerably by 2061, although less than the second group.

If the analysis is pushed further, drawing a horizontal line at the level of 0.50 identifies six groups, in fact splitting each major group in two. The first subgroup group on the left (BE, SE, FI, DK, UK and FX) has slightly higher values of the OADRs, while the subgroup composed by IE, CY and LU is the "best performer" in the sense above described, as it has the youngest age structure at the beginning and at the end of the projections. In the second major group, the subgroup composed by PL and SK is separated from the other countries due to their higher increase of the OADRs. The split on the last major group in fact isolates Austria, which has indeed the lowest level of the OADR in 2061 in that group.

Figure 16: clustering of the Member States based on young and old dependency ratios in 2008 and 2061



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