European Demographic Data Sheet 2012

Population projections: Data, methods and assumptions

We provide population projections for the following 43 countries included in the European Demographic Data Sheet 2012: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France (metropolitan, excluding overseas territories), Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia FYR, Malta, Moldova, Montenegro, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom. We produce two scenarios: a) projections with migration; b) projections without migration.

To project the population by age and sex from 2011 to 2050 we use the standard cohort-component model.

The demographic data for the starting year 2011 are based on Eurostat database. The population by age and sex refers to 1 January 2011, except for Armenia (2010), Belgium (2010), Cyprus (2010), Romania (2010), the Russian Federation (2010) and Switzerland (2010)[1]. For Albania we interpolate the UN estimates for 2010-2015 (United Nations 2011). Data for Belarus are from the national statistical office.

The total fertility rates (TFR) for the starting year rely on the information available for 2010 (2009 for Belgium and Cyprus). The 2010 fertility data are based on the official vital statistics and population data, reported by Eurostat and national statistical offices. Most of the TFR data were computed by the Wittgenstein Centre for Population and Global Human Capital (WIC); for a few countries, the TFR data originate from Eurostat or national statistical offices (Albania, Armenia, France, Georgia, Italy, Switzerland and the United Kingdom).

For the age schedule of fertility we rely on the age-specific fertility rates published by Eurostat, mainly referring to 2010. For Armenia, Belgium, Cyprus, France, Italy, Romania, the Russian Federation, Switzerland and the United Kingdom the value is for 2009. Data for Belarus are from the Human Fertility Database and refer to 2009. For Albania fertility rates by single-year of age are graduated from rates by five-year age groups published by the national statistical office for 2008.

The relative distribution of fertility by age is kept constant throughout the projection period.

The information for the life expectancy at birth for the base year is mostly retrieved from Eurostat and refers to the year 2010. Information for Italy is from Istat. For Albania we average UN estimates for 2005-2010 and 2010-2015 (United Nations 2011). Data for Belarus are from the Human Mortality Database. For the following countries we use data for 2009: Armenia, Belgium, Cyprus, France, Romania, the Russian Federation, Switzerland, Turkey, and the United Kingdom.

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[1] For these countries the population size on 1 January 2011, published in the European Demographic Data Sheet 2012, is the result of projections by the Wittgenstein Centre for Population and Global Human Capital.

Probabilities of death by age and sex originate from Eurostat. The last available year at the time of extraction is 2010, except for Armenia (2009), Belgium (2009), Cyprus (2009), France (2009), Italy (2008), Romania (2009), the Russian Federation (2009), Switzerland (2009), Turkey (2009), and the United Kingdom (2009). For Belarus we have information from the national statistical office. For Albania we interpolate the UN estimates for 2010-2015 (United Nations 2010).

The information on the total number of net migrants is derived from Eurostat and refers to 2010. For Lithuania we use 2009 data, as the value for 2010 showed an extreme peak which we preferred not to consider as the starting point for our projections. For the following countries the number of net migrants for 2010 is based on the estimation by the Wittgenstein Centre for Population and Global Human Capital: Albania, Armenia, Belarus, Georgia, Romania, the Russian Federation, Serbia and Ukraine. For Moldova, Montenegro and Turkey we rely on the average value based on Eurostat data for 2004-2008. The distribution by sex and age for the 27 EU countries, Iceland, Norway and Switzerland for 2010 is derived from Eurostat projection assumptions (Europop 2010). For the other countries we assume an equal distribution by sex of the total number of net migrants. For these countries the age distribution follows an average profile estimated from the information available for the EU countries.

The basic information regarding population data and projection assumptions is summarized in Table 1.

Assumptions for the period total fertility rate (TFR) for the European Demographic Data Sheet 2012 projections are based on the results for the main fertility scenario of the global expert-based projections for low-fertility countries prepared by the Wittgenstein Centre for Population and Global Human Capital. Three time points, i.e. 2015, 2030 and 2050, were considered and linear interpolation was used to estimate values in intermediate years. The TFR estimates for 2030 and 2050 were derived by combining results of an online survey of experts, a workshop with invited 'meta-experts' as well as final checks, corrections and alterations by the coordinating team. The procedure included several steps. First, based on expert views, main TFR scenarios were derived as averages for all experts assessing a given country. Only countries for which at least two experts provided their estimates were considered (Austria, Bulgaria, Croatia, Czech Republic, Finland, Georgia, Germany, Hungary, Italy, the Netherlands, Norway, Poland, Romania, the Russian Federation, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and Ukraine). Second, this 'initial' period TFR projection was discussed and partly adjusted for selected countries by a smaller group of invited 'meta-experts'. These experts also provided projected TFR values for larger countries with no responses collected in the survey. The 'meta-experts' focused on the following countries: Czech Republic, Germany, Italy, the Russian Federation, Spain, Sweden, and the United Kingdom. Third, the WIC coordinating team defined broader regions within Europe and one or two key 'representative' countries in each region. Every country in the region, for which the projected TFR was not defined by the experts or 'meta-experts' was attached to a 'representative' country and allocated its period TFR in 2030 and 2050. Fourth, minor adjustments were made by the coordination team to assure consistency, internal logic and broad comparability of data for different countries. Finally, the TFR for 2011-2015 was defined taking into account the possible effect of the recent economic recession, which hit especially the most developed countries. Subsequent cuts in government spending led to a huge increase in economic and employment uncertainty. This uncertainty affects especially younger men and women and is likely to negatively influence their childbearing decisions and thus also aggregate fertility rates. The projections assume that in the countries where the TFR

is expected to rise between 2010 and 2030, the TFR will initially remain 'frozen' at the 2010 level until 2015 and only then it will follow a linear increase up to the projected values for 2030. This temporary freezing of period fertility rates partly reflects the on-going influence of the economic recession, which has led to declines or stagnation of period fertility rates in most countries of Europe after 2008 (for more details see the box on Economic Recession and Recent Fertility Trends in Europe on the European Demographic Data Sheet 2012). In countries where a TFR decline is expected between 2010 and 2030, the TFR is assumed to follow a linear trajectory, without any recession-induced interruption or acceleration between 2010 and 2015.

Assumptions on life expectancy at birth are based on a demographic trend often neglected in the discussion on the future development of the life span, namely that the currently younger cohorts are healthier than their older peers. When these young cohorts reach old age, their mortality rates may thus be lower than those of the currently old cohorts. In populations comprising a growing number of healthier cohorts, mortality will continue to decline. We call this *mortality inertia*: it implies the existence of a transitory period in the future, when age-specific mortality rates are likely to change if they change in the current period. We use these transient dynamics to forecast mortality. For low-mortality countries, we forecast the conventional period life expectancy at birth to be 90 years by 2050, which exceeds the UN forecast by about five years. The results obtained with our method are consistent with the previously reported linear trend in the conventional period life expectancy for low-mortality countries and in line with the assumptions used in previous editions of the European Demographic Data Sheet. For higher-mortality countries in transition (see the list in the box on Future life expectancy in developed countries on the European Demographic Data Sheet 2012), where mortality has increased considerably in recent decades, we assume future increase in life expectancy. To this end, we assume the difference between their across-country-averaged life expectancy and that of the lower-mortality countries in transition to be constant at 2008 level. For further details see the box on Future life expectancy in developed countries on the European Demographic Data Sheet 2012. The Brass relational model is used to adjust the age specific mortality schedule.

Regarding migration assumptions for the 27 EU countries, Iceland, Norway and Switzerland, we assume that in 2015 the total net migration converges to the Eurostat projected values for the same year and follows the Eurostat 2010 projections thereafter. We assume constant net migration for the following countries: Albania, Armenia, Azerbaijan, Belarus, Croatia, Georgia, Macedonia FYR, Moldova, Montenegro, the Russian Federation, Serbia, Turkey, Ukraine. In particular, for Georgia and Serbia we assume zero net migration. The migration age profile remains constant.

References
Europop 2010. Eurostat Population Projections 2010-based: Convergence scenario-national level.

United Nations (2011), Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2010 Revision.

Table 1 Total population size in 2011 (1st Jan), fertility, mortality and net migration in 2011 and 2050

	Total population (mio.) 2011 (1st Jan)	Total fertility rate		Female e0 (years)		Male e0 (years)		Net migration (thousands)	
		2011	2050	2011	2050	2011	2050	2011	2050
Albania	3.3	1.4	1.5	80.2	88.2	74.1	83.0	-10.0	-10.0
Armenia	3.2	1.6	1.7	77.0	85.1	71.1	79.9	-6.0	-6.0
Austria	8.4	1.4	1.6	83.8	93.6	78.2	88.0	27.3	27.9
Azerbaijan	9.1	1.9	1.7	76.2	84.7	71.4	79.9	1.4	1.4
Belarus	9.5	1.5	1.6	76.7	83.2	64.9	76.0	-8.8	-8.8
Belgium	11.0	1.8	1.8	83.2	92.1	77.7	86.6	82.2	35.5
Bulgaria	7.5	1.5	1.6	77.5	84.5	70.5	79.3	-21.5	3.8
Croatia	4.4	1.5	1.6	80.1	88.0	73.8	82.8	-4.9	-4.9
Cyprus	0.8	1.5	1.6	84.1	93.0	79.1	88.0	-1.8	4.7
Czech Rep.	10.5	1.5	1.7	81.1	88.6	74.8	83.4	18.9	24.1
Denmark	5.6	1.9	2.0	81.6	91.8	77.4	87.6	15.8	8.7
Estonia	1.3	1.6	1.7	81.0	88.7	71.0	83.4	-0.1	0.8
Finland	5.4	1.9	2.0	83.7	92.9	77.1	86.3	13.8	8.2
France metrop.	63.1	2.0	1.9	85.4	94.2	78.4	87.2	76.8	70.7
Georgia	4.5	1.9	1.7	79.0	85.7	70.3	80.5	0.0	0.0
Germany	81.8	1.4	1.6	83.2	92.6	78.2	87.6	122.0	87.7
Greece	11.3	1.5	1.6	83.0	92.0	78.6	87.6	5.8	29.8
Hungary	10.0	1.3	1.6	78.8	86.9	71.0	81.7	14.5	22.0
Iceland	0.3	2.2	2.0	84.3	92.4	80.0	88.1	-2.0	0.7
Ireland	4.5	2.1	1.9	83.6	94.5	79.1	90.0	-27.0	17.3
Italy	60.6	1.4	1.6	84.5	93.2	79.3	88.0	319.8	269.8
Latvia	2.2	1.2	1.6	78.6	85.4	68.9	80.1	-6.7	1.9
Lithuania	3.2	1.6	1.7	79.0	84.2	68.2	77.1	-14.2	2.2
Luxembourg	0.5	1.6	1.8	83.7	92.5	78.1	86.9	7.1	2.8
Macedonia FYR	2.1	1.6	1.6	77.4	85.9	73.1	81.6	-0.6	-0.6
Malta	0.4	1.4	1.6	83.8	92.8	79.4	88.4	1.7	0.5
Moldova	3.6	1.3	1.5	73.7	80.5	65.2	75.3	-3.2	-3.2
Montenegro	0.6	1.7	1.6	78.6	87.1	73.7	82.2	-0.1	-0.1
The Netherlands	16.7	1.8	1.8	83.2	91.8	79.1	87.7	30.1	5.9
Norway	4.9	2.0	2.0	83.5	92.9	79.2	88.6	39.2	13.4
Poland	38.2	1.4	1.6	80.9	87.4	72.4	82.2	2.4	34.2
Portugal	10.6	1.4	1.7	83.0	92.8	76.9	86.7	8.6	30.7
Romania	21.4	1.3	1.5	77.7	85.1	70.4	79.9	-38.5	16.8
Russian Fed.	141.9	1.5	1.7	75.0	81.5	63.3	74.3	250.0	250.0
Serbia	7.3	1.4	1.6	77.2	85.7	72.0	80.5	0.0	0.0
Slovakia	5.4	1.4	1.6	79.4	85.5	71.9	80.3	4.9	9.9
Slovenia	2.1	1.6	1.7	83.3	92.3	76.6	85.6	1.3	5.0
Spain	46.2	1.4	1.7	85.5	93.2	79.3	87.0	81.9	209.7
Sweden	9.4	2.0	2.0	83.8	92.2	79.8	88.2	48.6	21.7
Switzerland	7.9	1.5	1.8	85.0	93.5	80.3	88.8	59.4	31.0
Turkey	73.7	2.0	1.6	79.1	87.6	73.9	82.4	42.8	42.8
United Kingdom	62.4	2.0	1.9	83.0	91.5	78.8	87.3	169.6	148.5
Ukraine	45.6	1.4	1.6	75.5	81.8	65.5	76.3	-50.0	-50.0