

SHORT METHODOLOGICAL NOTE ON THE ESTIMATED MIGRATION FLOWS AND THE ESTIMATED POPULATION 1991-2014

General

The population of a country changes from year to year according to the following equation:

$$P_{t+1} = P_t + B_t - D_t + I_t - E_t$$

where:

P_{t+1} , P_t : the population on 1st January of years $t+1$ and t , respectively

B_t and D_t : the births and deaths occurred during the year t , and

I_t and E_t : the number of immigrants and emigrants during the year t .

Given that the events of the Natural Movement of Population come from reliable administrative sources, the calculation process of the population goes back to the calculation process of migration flows.

For the purposes of this methodological note, the estimated populations on 1.1.1991 (10,272,691 people) and on 1.1.2011 (11,123,392 people) are considered as constants. The specific populations have been estimated from the results of the Censuses of the respective years, taking into account the results of the Post Enumeration Surveys of these Censuses¹. The results of 2001 Population Census were not taken into account for two reasons: a) these results do not meet the necessary quality guarantees given that a Post Enumeration Survey was not used for that Census and b) backward estimates of 2011 Census data revealed some quality issues of the 2001 Census data.

The immigration and the emigration were estimated for the period 1991 – 2014. The immigration was separately estimated for the periods 1991 – 2010 and 2011 – 2014. The emigration was separately estimated for the periods 1991 – 2001, 2002 – 2007, 2008 – 2009, 2010 – 2013 and the year 2014. The reason of these separate estimates is the availability of data in each period.

¹ The Post Enumeration Survey of a Population Census is a sampling survey that evaluates the results of the Census with regard to potential underestimation or overestimation of the size of the permanent population as well as to the capturing of the characteristics of the population.

IMMIGRATION

Period 1991-2010

The immigration per year was estimated by using the results of the 2011 Population Census (answer to the relevant question on the year of entry in Greece and taking into account the coverage error of the Post Enumeration Survey), the results of the MIMOSA project that estimated migration flows to and from EU Member States for the years 2002-2007, and the estimated population as of the 1st January of 1991 and 2011.

In order to estimate the annual immigration percentage that was not “captured” on the basis of the 2011 Population Census due to deaths, departures from the country, etc. the ratios of non-observed to observed values of the immigration of each year as these are derived from the 2011 Population Census were used.

It was found out that these ratios are better approximated by an exponential function of the form $f(t)=ae^{bt}$. The function $f(t)$ satisfies the following:

$$\frac{Imm_{unobs,t}}{Imm_{obs,t}} = f(t) = \begin{cases} 1, & Imm_{unobs,t} = Imm_{obs,t}, \quad t = 2010 \\ > 1, & Imm_{unobs,t} > Imm_{obs,t}, \quad t < 2010 \end{cases}$$

where

$Imm_{obs,t}$: the immigration of year t , as derived from the 2011 Population Census

$Imm_{unobs,t}$: the actual immigration that includes the not “captured” immigration (due to deaths, departures from the country, etc.) of year t .

Specifically for the year 2010, the value of immigration for this year (60.482 people) as derived from the 2011 Population Census (including the coverage error) is considered as the actual value, which coincides with the observed value, i.e., $f(t)=1$.

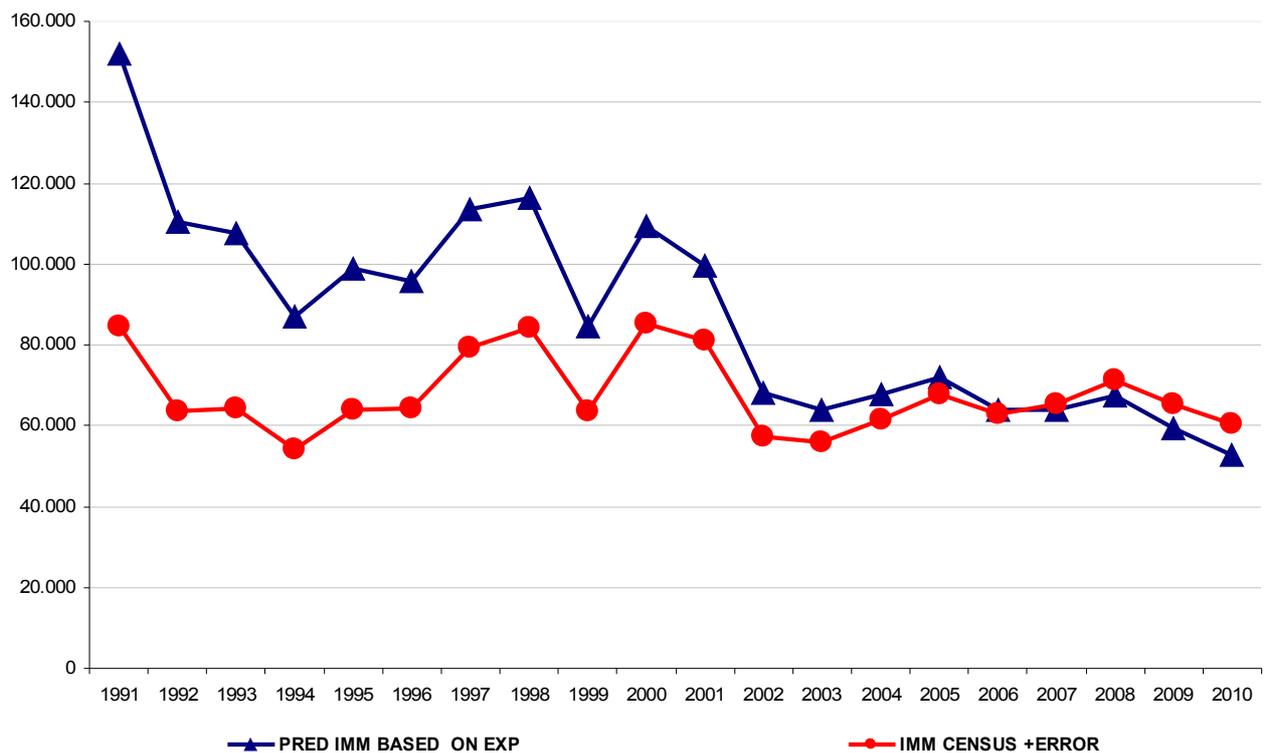
Moreover, the values derived from the MIMOSA project for the period 2002-2007 are considered as actual values (Imm_{unobs}), which are compared with the values of the corresponding years derived from the 2011 Population Census (including the coverage error) (Imm_{obs}).

The formula of the function $f(t)$ was derived on the basis of the above, and by considering as constants the estimated populations as of the 1st of January 1991 (10.272.691 people) and as of the 1st January 2011 (11.123.392 people).

Therefore, for each year t , the total immigration (including the not “captured” immigration), $Imm_{unbs,t}$, was estimated on the basis of the calculated ratio $Imm_{unbs,t} / Imm_{obs,t}$, and the annual immigration derived by the 2011 Population Census (with the coverage error), $Imm_{obs,t}$.

The following diagram depicts the values of variables $Imm_{obs,t}$ and $Imm_{unbs,t}$, as these are derived by the use of the above exponential function.

Estimates of the immigration by the use of the exponential function and immigrants on the basis of the 2011 Population Census



Period 2011-2014

For the elaboration of a scientifically acceptable method for the estimation of the annual immigration based on statistical criteria, alternative methods for the estimation of the annual immigration after 2010 (the latest year with available data from the 2011 Population Census) were considered on the basis of the available data so far and finally the method that meets the above criteria was selected.

All the above estimation methods were based on the total immigration as derived from the immigration data of the 2011 Population Census, including the coverage error from the Post Enumeration Survey of the 2011 Population Census and on the estimation of the immigration not “captured” due to deaths, departures from the country, etc. of the years 1992-2009.

On the basis of the above calculations for estimating the values of immigration and taking into account the advantages and disadvantages of the considered models, the following linear model was selected with dependent variable the total annual immigration, including the immigration not “captured”, of the previous year and the GDP rate of growth of the previous year.

$$\ln(Y) = 3,219 + 0,711*\ln(X_1) + 0,008*X_2$$

where

Y: total annual immigration including the immigration not “captured”

X₁: total annual immigration including the immigration not “captured” of the previous year

X₂: GDP rate of growth of the previous year

The method for estimating the immigration will be subject to revision and assessment in the coming years, with a view to investigating possible improvement by additional data that will be collected from the countries representing the countries of origin of the majority of immigrants in Greece, etc. Moreover, the availability of data from administrative sources that could improve the quality of estimates of immigration for the period between the 2011 and 2021 Population Censuses should be explored.

EMIGRATION

Period 1991 – 2001

The estimates of the emigration of this period were based on the emigration data of the project MIMOSA for 2002 and on the annual percentage changes, for the years 1991 – 2001, of the data on Greek immigrants of 7 countries (Germany, United Kingdom, Netherlands, Finland, Sweden, Denmark and Norway) that possess a complete time series.

Period 2002-2007

For the period 2002 – 2007, the results of the project MIMOSA regarding emigrants were used.

Period 2008-2009

For the years 2008 and 2009, the percentage changes of available data in EU countries were used.

Period 2010-2013

For the years 2010-2013, the calculation was made in two parts with two different groups of countries. More precisely:

The first group of countries (Group 1) consists of countries that are destinations of returning nationals from Greece. The basic country in this category is Albania, for which repatriation data are available since 2009. This category includes also other countries like Bulgaria, Romania, Ukraine, Georgia, Moldova, Russia, Poland and Armenia. The repatriates of these countries for the years 2009 – 2013 were estimated proportionately on the basis of 2011 Census data.

The second group of countries (Group 2) consists of countries that are main destinations of Greek emigrants. For 2009, the number of emigrants of Group 2 was estimated by subtracting the number of emigrants of Group 1 from the total number of emigrants. Then, for the years 2010–2013 the estimation was based on the rate of change of data on Greek immigrants that were available in EU and non-EU countries for these years. These countries are Germany, United Kingdom, Belgium, Sweden, Switzerland, Netherlands, Austria, Finland and United Arab Emirates.

Year 2014

For the year 2014, since the corresponding data from other countries are not yet available, the estimation was made using the following regression model with independent variable $X = A^{\text{Ln(GDP)}}$, where A is the unemployment rate.

:

$$Y = 0,00290 * A^{\text{Ln(GDP)}} + 45411,9$$

For the year 2014 the emigration is estimated to 117.051 people.

As in the case of immigration, the method for estimating the emigration will be subject to revision and assessment in the coming years, with a view to investigating possible improvement by additional data which will be collected from the countries representing the countries that are destinations of returning nationals from Greece or main destinations of Greek emigrants. Moreover, the availability of data from administrative sources that could improve the quality of estimates of immigration for the period between the 2011 and 2021 Population Censuses should be explored.

ESTIMATED POPULATION 1991 - 2014

On the above basis, the estimated populations on the 1st January for the years from 1991 to 2011 are as follows:

	IMM	EM	NET	LB	D	LB-D	ESTIMATED POP 1.1.
1991	151.978	64.628	87.350	102.620	95.498	7.122	10.272.691
1992	110.334	52.389	57.945	104.081	98.231	5.850	10.367.163
1993	107.462	52.929	54.533	101.799	97.419	4.380	10.430.958
1994	86.959	46.813	40.146	103.763	97.807	5.956	10.489.871
1995	98.989	47.967	51.022	101.495	100.158	1.337	10.535.973
1996	95.585	54.628	40.957	100.718	100.740	-22	10.588.332
1997	113.477	51.794	61.683	102.038	99.738	2.300	10.629.267
1998	116.411	60.119	56.292	100.894	102.668	-1.774	10.693.250
1999	84.695	54.175	30.520	100.643	103.304	-2.661	10.747.768
2000	109.251	46.993	62.258	103.274	105.170	-1.896	10.775.627
2001	98.471	45.909	52.562	102.282	102.559	-277	10.835.989
2002	67.220	39.378	27.842	103.569	103.915	-346	10.888.274
2003	63.141	37.433	25.708	104.420	105.529	-1.109	10.915.770
2004	66.871	38.041	28.830	105.655	104.942	713	10.940.369
2005	70.933	38.583	32.350	107.545	105.091	2.454	10.969.912
2006	63.094	38.368	24.726	112.042	105.476	6.566	11.004.716
2007	63.298	40.400	22.898	111.926	109.895	2.031	11.036.008
2008	66.529	43.044	23.485	118.302	107.979	10.323	11.060.937
2009	58.613	43.686	14.927	117.933	108.316	9.617	11.094.745
2010	60.462	62.041	-1.579	114.766	109.084	5.682	11.119.289
2011							11.123.392

For the period 2011 – 2014 the estimated populations on the 1st January are:

	IMM	EM	NET	LB	D	LB-D	ESTIMATED POP 1.1.
2011	60.089	92.404	-32.315	106.428	111.099	-4.671	11.123.392
2012	58.200	124.694	-66.494	100.371	116.668	-16.297	11.086.406
2013	57.946	117.094	-59.148	94.134	111.794	-17.660	11.003.615
2014	59.016	117.051	-58.035	92.094	113.887	-21.793	10.926.807
2015							10.846.979

IMM: Immigration

EM: Emigration

NET: Net migration

LB: Live births

D: Deaths

POP 1.1: Population on 1st January