Net migration estimates for Greece by age, sex and citizenship, 1991-2001

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Abstract

This paper applies techniques of demographic analysis to official data of Greece to obtain net migration estimates by age, sex and citizenship for the intercensal period 1991-2001. It is found that the overall net immigration rate for the decade is 6.3 per 100 resident population and the contribution of foreign immigrants to this figure is 88.2 per cent. 85.4 % of the net immigrants are of working age and 70.3 % of net immigrant women are of reproductive age. The results of the study can be used to formulate assumptions regarding the migration component when handling population estimates and projections.

Keywords: net migration estimates; survival ratio method; citizenship; Greece.

Introduction

Migration has always been an important socio-demographic element of Greek history, but after the significant historical events of the 1990s (the collapse of the former USSR, the Albanian Regime shift and the liberalization of the Eastern European economies) immigration constitutes a new phenomenon for the country producing a measurable impact on the size, growth and composition of the population. According to available census information, the foreign population share living in Greece more than quadrupled within a decade and jumped from 1.6% in 1991 to 7.0% in 2001 (NSSG, 2007; Verropoulou et al., 2007) with net-immigration being nearly the sole agent of population growth. It is clear

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that if these trends continue, migration will also have a palpable effect in the future.

In light of the ongoing era of migration and unprecedented socio-political change (Castles and Miller, 1998; Demeny, 2002) it is a point of great interest to measure population movements both for statistical and administrative purposes. From a demographic perspective, the measurement of migration is important for analysing population dynamics and for carrying out reliable population estimates and projections. Furthermore, in view of large scale immigration the governments usually take initiatives in making new legislations and implementing social schemes specifically aimed at migrants (IOM, 2003; Vignon, 2005).

Traditionally, international migration data were obtained through statistical material collected at the borders and airports. The formation of the European Single Market invalidated this source, however, by permitting freedom of movement between countries of the European Union. The collection of the Greek Frontier Control Records was discontinued in 1977. Since then, scarce sampling surveys, administrative sources (including legalisation programmes) and population censuses provide valuable statistical information on population by citizenship, at various levels of detail and reliability.

The decennial census statistics in Greece are, as in many other countries, the most complete source of migration outcome at a nation-wide scale. Census questions on citizenship provide stock statistics on the enumerated migrant population, while a question on the place/country of usual residence at a fixed time prior to census offers information on immigration. Census material does not provide data on emigration, however, nor does it provide any indication of the volume of migration during any particular past period of time.

In view of the lack of statistics about migration outflows and inflows it is necessary to apply techniques of demographic analysis to estimate the volume of migration for an assumed time interval. There are a variety of methods in this

field but with the exception of a few attempts, which aim at modeling emigration from specially designed survey data (Zaba 1986, 1987; UN, 1986), in most cases only the balance of migration is estimated. Application of the Vital Statistics Method to Greek census and vital registration data for the period 1991-2001 resulted in a net immigration of 685.1 thousand persons representing 97.3% of the total population change of the period. This figure, derived as the difference between the population change and the natural increase, denotes the combined net movement of the total resident population of the country without distinguishing between sexes, age groups or citizenships (Tsimbos, 2006). Appropriate application of the method to particular birth cohorts can yield net migration estimates by age and sex, but this is feasible only if death statistics are available by age of the deceased and by time of death (UN, 1970; Wunsch and Termote, 1978), which is not the case for Greece.

In this paper, techniques of demographic analysis are applied to official statistics in order to obtain net-migration estimates of the population of Greece by age, sex and citizenship for the last intercensal period (1991-2001). It is the first time that such material is produced for Greece and the results of the study can be used to formulate assumptions regarding the migration component when handling population estimates and projections.

Data and methods

The analysis uses material from the 1991 and 2001 censuses as well as vital statistics of the period 1991-2001, compiled by the National Statistical Service of Greece (NSSG, 2007). The data refer to the number of residents of the country, classified by sex and 5-year age groups, as enumerated at the two successive censuses, and to the number of live-births to mothers residing in Greece recorded during the intercensal interval. As is described below, the approach to the estimation of net-migration also requires a measure of the mortality of the population. This is made on the basis of the available national life-tables, at the beginning and the end of

the intercensal period (NSSG, 2007). For a better representation of the mortality conditions pertaining to the decade under research, the intercensal survivorship probabilities used have been obtained by averaging the appropriate survival ratios of the 1990 and 2000 national life tables (UN, 1970).

The age and sex net migration estimates presented in this study have been obtained by applying the Life Table Survival Ratio Method. Moreover, a specific residual procedure is proposed in order to make an approximate calculation of the number of net migrants by citizenship; only two segments are considered, Greek and foreign net migrants. Greek citizens, in particular, include also persons with dual citizenship representing 0.8% of the population. The technique is based on the principles of the Cohort Component Method of projecting a closed population under the actual fertility and mortality conditions of the intercensal period and can be applied using three different assumptions, each resulting in a different estimate (Shryock et al., 1975; Rowland, 2006).

In the case of the Forward Survival approach the birth cohorts of the base population (1991) are "aged" to the date of the second census (2001) so as to obtain an expected number of survivors. The intercensal net-migration movement of the cohorts is then obtained as difference between the enumerated and the projected population. This approach assumes that all migration occurs at the end of the period and tends to underestimate the volume of the net movement since it does not account for migrants who died during the interval. The assumption that all migration occurs just before the end of the period is not realistic for Greece since, according to the First Greek Legalization Programme, in 1998 there were already 372 thousand immigrants living in the country (Cavounidis, 2002) representing about half of those recorded by the 2001 population census.

According to the Reverse Survival approach the age structure of the terminal population (2001) is "revived" to the date of the first census (1991) so as to estimate an expected initial population and subsequently, the balance between the two. This approach considers that all migration occurs at the

beginning of the period; it includes deaths among migrants but assumes that immigrants lived in the host country during the whole interval, thereby tending to overestimate the volume of the net population movement through the overestimation of immigrant deaths. Although moderate migration inflows were observed during the 1980s, there is evidence that the considerable migration intakes recorded by the 2001 census occurred during the period 1991-2001 rather than at the beginning of the intercensal interval or the end of the previous decade (Psimmenos and Georgoulas, 2001); hence the assumption on which this procedure relies is not plausible in the case of Greece.

Finally, the Average Survival approach yields a mean net migration volume of the forward and reverse estimates; this procedure assumes migration is evenly distributed over the intercensal interval or that all migration occurs in the middle of the decade. This assumption reflects the experience of Greece in the 1990s, as is clearly indicated by the recently released IPUMS micro-census data on the immigration of foreign citizens by year of arrival (Minnesota Population Center, 2007). A further application of the Refined Survival Ratio Approach (Siegel, 2002; Siegel and Swanson, 2004) adjusting for bias in the number of migrants who died during the intercensal interval, delineates that the "refined" and "average" estimates are very close over all age groups, thereby adding credit to the Average Survival method and making it the most appropriate for the Greek case.

The accuracy of the estimates is subject to the quality of the available statistical information. The application of the method shows that incompatibilities between the smooth life table survivorship ratios and the rather irregular census age data give rise to an irregular age pattern of net migration. Some pronounced discrepancies are eliminated by graduating the net migration estimates only in selected ages so as not to distort the age pattern of the phenomenon.

This method was first applied to the total resident population of the country to obtain net migration estimates for the population of Greece; these estimates therefore denote the

overall net intercensal migration movement of both Greek and non-Greek persons combined. Subsequently, the method was applied to the Greek resident population to obtain an estimate of the Greek citizens only. The total volume of net-migration significantly surpassed the estimate for Greek citizens indicating the importance of the inward movement of foreign manpower. Thus, as a third step, the difference between the total and the Greek net migration was calculated and assigned as an estimate of the intercensal net migration movement of all foreign citizens.

An attempt was also made to obtain some rough estimates of net migration for the most numerous ethnic groups in 2001, Albanians (57.5%), Bulgarians (4.6%), and Romanians (2.9%). As their relative age-sex distribution recorded by the last census do not depict the demographic characteristics of migrants for the whole decade, a more crude method had to be used relying on changes in the total numbers of each ethnicity between the two successive censuses (Siegel and Swanson, 2004). These estimates are affected by the relative completeness of the two successive censuses, the number of immigrant deaths (unknown in the case of Greece) and the number of naturalizations, which according to the official records was small in that period (Emke-Poulopoulou, 2007).

Results

The results of the study are presented in Table 1. The estimated total net migration for the decade (688,220) reveals a substantial inward population movement with a rate of 6.3 net immigrants per 100 resident population of the country at the end of the interval (2001). The net immigration of Greek citizens (81,475) represents 11.8 % of the total net migration volume of the period, while the net immigration of foreign citizens (606,745) conveys the residual 88.2 %.

Due to the relatively large number of foreign incomers, the shape of the age-curve of Greece is determined to a large extent by the inflows of foreign citizens (Figure 1). The estimates for the Greek population show a net emigration in ages 0-9 and 80 or higher; these results, particularly for the

older age group, are rather implausible and are possibly bound up with age misstatements not uncommon amongst older people. As has been demonstrated, if the net migration rates of the native population are much lower compared to the corresponding rates of the foreign population then the effects of any data distortion can be expected to be greater for the native than for the foreign estimates (Hill, 1987).

Table 1: Net intercensal migration estimates of the population of Greece by age, sex and citizenship: 1991-2001

	Greek resident population			Foreign resident population		
Age	Males	Females	Both	Males	Females	Both
0-4	-3664	-5704	-9368	19674	18099	37773
5-9	-2373	-3442	-5815	22753	21185	43938
10-14	807	172	979	20174	13184	33358
15-19	6865	1821	8686	34949	23008	57957
20-24	827	290	1117	52801	33432	86233
25-29	703	1929	2632	46647	39681	86328
30-34	3252	4201	7452	44616	33350	77966
35-39	8988	3960	12948	29756	25610	55366
40-44	9009	4635	13644	24615	22543	47157
45-49	8060	6202	14262	15077	17043	32120
50-54	5429	7912	13340	9064	11159	20223
55-59	3902	10259	14161	4832	6456	11288
60-64	3852	14477	18329	3713	2532	6244
65-69	7250	13445	20695	2250	1821	4071
70-74	2275	609	2884	1753	2017	3250
75-79	227	131	358	882	368	1770
80-84	-2857	-10645	-13501	537	818	1355
85+	-8113	-13216	-21329	32	317	349
Total	44438	37037	81475	334124	272621	606745

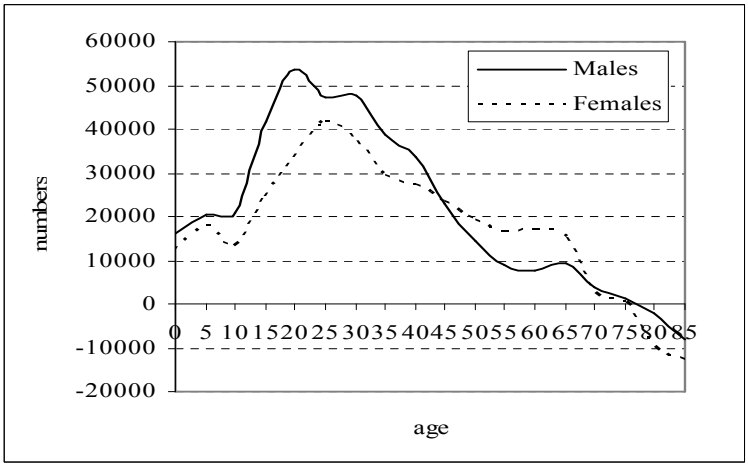
Table 1: Continued…

	Total Resident population		
Age	Males	Females	Both
0-4	16010	12395	28405
5-9	20380	17743	38123
10-14	20981	13356	34337
15-19	41814	24829	66643
20-24	53628	33722	87350
25-29	47350	41609	88959
30-34	47868	37550	85418
35-39	38743	29571	68314
40-44	33624	27178	60802
45-49	23137	23245	46382
50-54	14493	19070	33563
55-59	8734	16715	25449
60-64	7565	17009	24574
65-69	9500	15266	24766
70-74	4027	2626	6134
75-79	1109	499	2128
80-84	-2320	-9827	-12146
85+	-8081	-12899	-20980
Total	378562	309658	688220

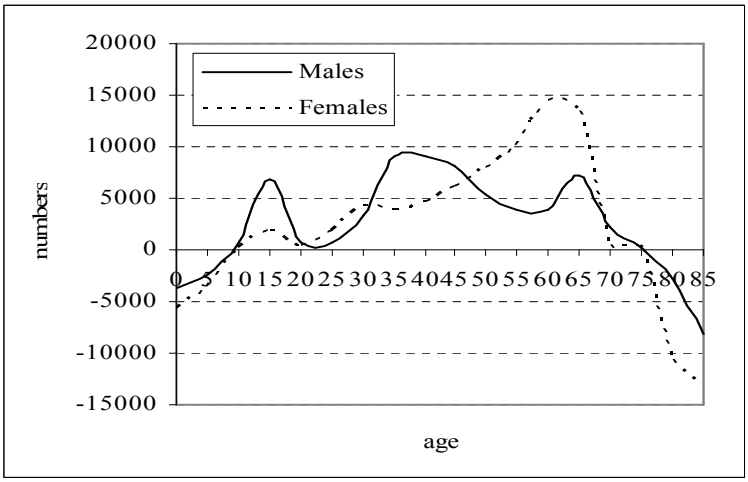
Overall, the sex ratio of net immigrants is 122 males per 100 females and it is slightly lower among Greek (120) than among foreign (123) citizens. The latter refers to all immigrants and does not reflect the sex imbalance of certain ethnic groups exhibiting very high proportions of males (93% among migrants from Pakistan, India, and Bangladesh) or of females (76% among immigrants from the former USSR and the Philippines).

Examining broad age ranges reveals that up to the age of 45 years the volume of net migration is greater for males and this may be related to the higher propensity of men for seeking employment and job opportunities, as it is revealed by

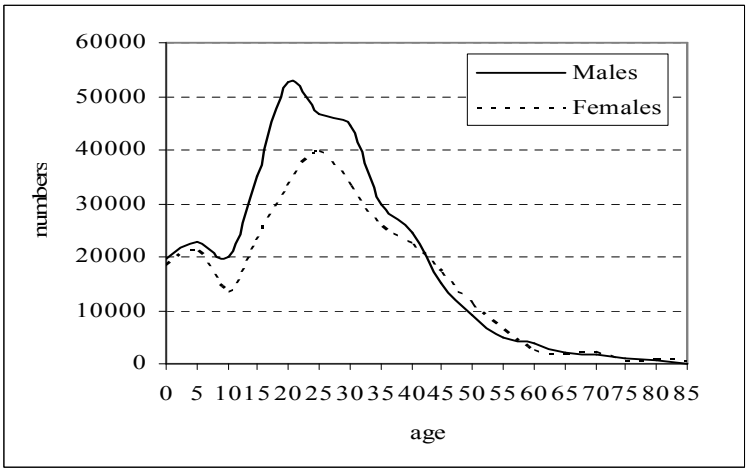
Figure 1: Age and sex patterns of net intercensal migration estimates of the population of Greece by citizenship: 1991-2001.



A: Total Greece



B: Greek citizens



C: Foreign citizens

the 2001 census tabulations (NSSG, 2007). The reverse is ex-

hibited for ages 45 or higher and this can be partly attributed to the prevailing return migration patterns or family reunification movements.

Estimation of net migration (all ages combined) derived as the difference between the 1991 and the 2001 census counts are very close to the results obtained by the survival ratio method. Net immigration for the selected ethnic groups is estimated as 417,480 Albanians, 32,691 Bulgarians and 20,071 Romanians, representing 70.0%, 5.5% and 3.4% of the total volume, respectively.

Two methodological issues should be raised. The first refers to the influence of possible mortality differentials between the immigrants and the natives on the estimated intercensal population change due to migration. The hypothesis underlying the estimation of net-migration for the country is that the national life tables of Greece express the mortality conditions of both Greek and migrant populations. This is a commonly made assumption when applying projection techniques in the absence of separate life tables (Preston et al., 2001). Furthermore, it has been proved that if immigrants experience different death rates from the natives, then the volume of net migration is underestimated or overestimated depending on whether migrant mortality is higher or lower than non-migrant mortality (Wunsh and Termote, 1978). Nevertheless, empirical research shows that projection methodologies based on variant fertility and mortality levels do not greatly affect the outcome, at least in the short or medium term (Coleman, 2006). On these grounds, and in view of the lack of relevant data for the period under investigation, it was decided to proceed to the estimation of the net movement of foreign citizens as residual between the overall and Greek figures, rather than applying the estimation formulae directly to the age distributions of the foreign populations.

The second issue to consider is in connection with the size of the estimated net migration. To obtain correct estimates, the life table survival method requires the availability of appropriate life tables and reliable census data; a criticism of

the present application relates to the suspected deficiencies of the population statistics used. It has been already stated that the apparent limitations of the census data resulted in irregular age-patterns of net migration, partly reduced by smoothing techniques. Also, the volume of net migration can be influenced by enumeration miss-statements and under-recording errors, particularly in that the official census data used do not include the latent number of illegal migrants. Despite the fact that the 2001 census of Greece constitutes a clear improvement in covering foreign citizens compared to previous enumerations, the evaluation of material deriving from different administrative sources raise suspicion regarding the true size of the foreign population of the country; although there was no post-enumeration survey carried out by the Greek Statistical Authorities, there is some evidence that a number of about 200,000 immigrants remained unrecorded (Baldwin-Edwards, 2004). As the demographic characteristics of these persons are unspecified, their age-sex effects on the net migration obtained by the proposed method cannot be assessed, but obviously this global figure raises the size of the foreign population in 2001 by at least 26%. It is therefore likely that the estimated net migration derived by the application of the survival ratio method to the official 1991-2001 data may underestimate the true volume of immigration to an extent which, however, is not possible to quantify mainly because the relative under-recording of migrants in the 1991 census is unknown.

Discussion and conclusion

In regions affected by an influx of immigration, the availability of statistical information on the demographic, socio-economic and ethnic characteristics of the population facilitates understanding of the magnitude of certain community problems and the formulation of policies aiming at improving the living and working conditions in the society.

This paper applies the survival ratio method and a residual procedure to official data of Greece to obtain net migration estimates by age, sex and citizenship for the intercensal

period 1991-2001. The technique considers two population segments, Greek and foreign net migrants, but a rough picture of the net movement of the most numerous ethnic groups (Albanians, Bulgarians and Romanians) is also provided by the examination of successive census data. The total net-migration obtained through the proposed methodology is consistent with figures estimated in previous attempts using simpler methods (Tsimbos, 2006). The present results add value to the demographic analysis providing a base for carrying out population estimates and projections by incorporating the quantitative age-sex effects of future migration intakes to the growth and structure of the country's population. Despite some possible influences arising from shortcomings of the statistical information, the results of the study remain consistent. The overall net immigration rate for the decade is 6.3 per 100 resident persons; net immigration is higher for males than for females, in both absolute and relative terms, by about 25%. The contribution of foreign immigrants to the total migration of the period is 88.2 %; nearly 80% of the net migration volume of foreign citizens is attributed to three migrant groups, Albanians (70.0%), Bulgarians (5.5%) and Romanians (3.4%). A careful examination of the estimates delineates that 85.4 % of the net immigrants are of working age (15-64) and that 70.3% of net immigrant women are of reproductive age (15-49). These findings are of interest in considering future demographic developments since immigration affects the population growth and composition, both directly through its inflows and indirectly through the fertility and mortality of the migrants.

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