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Immigrant and Native Fertility in Greece: New Estimates and Population Prospects (2005-2025)

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Abstract

This paper uses the first available vital statistics by citizenship for Greece to estimate current fertility among immigrants and natives. Subsequently, population projections are employed to assess the demographic effects of migrant/native fertility and of immigration on the country's population for the period 2005-2025. It is estimated (2005) that immigrants exhibit earlier childbearing and higher total fertility (2.12) than natives (1.24). Of the ethnic groups considered, Albanians have the highest and Bulgarians the lowest rates. Although births to immigrants represent a considerable share (16.5%) their impact on overall fertility is very limited. The projections reveal that the ageing of the country's population is inevitable as the effects of variant levels of foreign/native fertility are minor and immigration, in spite of being the most important component having a favorable impact, cannot offset this process. The concept of Replacement Migration is an infeasible solution as it would require an unattainable intake of 4 million newcomers.

Keywords

Immigrant fertility, population projections, citizenship, vital statistics, Greece

1. Introduction

Immigration constitutes the most important socio-demographic transformation ever faced by the Greek society in the recent past. Since the 1990s, Greece has experienced unprecedented migration intakes as a result of significant historical events, such as the collapse of the former USSR and the accompanying liberalization of the economies of the Eastern European countries. Census data reveal that within a decade the share of the foreign resident population more than quadrupled from 1.6% (1991) to 7.0% (2001). Immigration flows occurred in the context of a sharp decline in fertility. During the last 20 years the total fertility rate followed a declining trend from 1.7 (1985) to 1.3 (2005) children per woman, reaching the so-called lower-low level of fertility (Kohler et al. 2002; Billari 2005). This situation resulted in negligible (or even negative) natural increase and accelerated population ageing. The direct effects of the recent migration streams became evident quickly. It is estimated that 97.3% of population change in the last intercensal period (1991-2001) is attributable to net immigration (Tsimbos 2006).

In countries having experienced sizeable migration inflows, the importance of immigration to childbearing and the growth of population is depicted in the data. In several European countries, the proportions of births assigned to women of foreign origin have been rising significantly. In recent years immigrant births represent a considerable share (15%-25%) of the total number recorded (Sobotka 2008). It has been demonstrated that immigrants retain higher fertility than natives, but their birth rates tend to converge to those of the indigenous population with increasing duration of residence in the host country (Kahn 1994; Toulemon 2004; Andersson 2004; Coleman 2005). The relationship between fertility and migration is multifaceted, and the interpretation of observed differentials and time dependent changes is difficult. The proposed migrant fertility theories (selectivity, disruption, minority, assimilation, cultural maintenance) are formulations of different aspects of human behavior. They contribute to a better understanding of immigrant reproduction, but they cannot explain all the ramifications of the phenomenon (Abbasi-Shavazi and McDonald 2002; Kahn 1988; Kulu 2005) as the integration of immigrants in the host country is a complex phenomenon persisting throughout their life history (Gabielli et al. 2007). At relatively high levels of inflows, immigration can have a favorable impact on the growth and ageing of low fertility populations (Coleman 2002). The long-term demographic effects of immigration on the host population are usually assessed through the application of projection methodologies. Projections of foreign or ethnic minority groups are, however, only available for a few receiving countries (Coleman 2005).

Until recently the only available source of information on immigrant fertility in Greece was the 2001 census. The census material refers to the reported number of children ever born alive by citizenship of mother. Analysis of these data reveal that completed cohort fertility of the immigrants is higher, on average, than that of the indigenous population, while among the ethnic groups investigated Albanians exhibit the highest and Bulgarians the lowest levels (Verropoulou et al. 2007; Bagavos et al. 2008). Vital registration data on total number of births indicate that after a decade of intensive immigration and declining childbearing, from 2001 onwards, the total number of births has been steadily increasing (9.5% in the last six years). It is suspected that this upward trend is, to a great extent, attributable to foreign residents, although it cannot be statistically confirmed due to the lack of appropriate information. It was not until 2005 that the National Statistical Service of Greece (NSSG) started collecting detailed vital registration data by citizenship. The first statistics show that births to immigrant women represent 16.5% of the total numbers recorded in 2005--a relatively high share compared to European countries with longstanding immigration histories (Sobotka 2008).

The present paper makes use of the first available vital registration data by citizenship with two main objectives. The first objective is to estimate current fertility levels and patterns among indigenous and foreign populations living in Greece. The second objective is to assess the potential contribution of migrant/native fertility, and of migration inflows, to the growth and structure of the population of the country in the next twenty years. For the purpose of the study, new population estimates by age, sex and citizenship are presented for the post census period. The paper fills a gap in the relevant literature as it is the first time that such a task has been carried out for Greece under open-population conditions (i.e., conditions that take into account levels of immigration and fertility by citizenship).

The next section deals with the data and methods used. This is followed by a presentation of the results of the study. The paper ends with a discussion of the main findings of the analysis and details the demographic implications and limitations of the study.

2. Data and methods

2.1 Definitions and data

For administrative and legislative purposes, the foreign-origin population in Greece is identified on the basis of citizenship (Ministry of the Interior 2007). This concept is also adopted in this study. Although inclusion of naturalizations in such data complicates the estimation of the potential size of the migrant population (Van der Gaag and Van Wissen 2002), this does not essentially affect the present analysis because, according to official records, the number of naturalizations in Greece up to 2004 is small (Emke-Poulopoulou 2007). The decennial census statistics are the most complete source of migration outcome at a nation-wide scale. Despite the evidence that a significant number of foreign citizens remained unrecorded (Baldwin-Edwards 2004), the last census (2001) constitutes a clear improvement in comparison to all previous enumerations.

This study uses detailed vital statistics of Greece by citizenship, available for the first time in 2005. This material is unpublished and has been kindly provided by the National Statistical Service of Greece. The data refer to the number of livebirths cross-classified by citizenship, birth order and age of mother. Two main sub-categories are considered: births to Greek and to non-Greek female citizens. Reference to Albanian and Bulgarian immigrants is also made as they constitute the two most numerous ethnic groups, representing 57.5% and 5% of the foreign-origin population in 2001 respectively.

After 2001 administrative sources provide basic information on population inflows but the data are incomplete and inappropriate for demographic research purposes. In view of the lack of reliable material on the age-sex structure and ethnic composition of the population for the post-census period, techniques of demographic analysis are applied to estimate such figures for 2005. These estimates are used as a baseline to obtain fertility rates and to carry out population projections by citizenship.

2.2 Population estimates

To estimate the age and sex structure of the population in 2005 the following procedure is followed. The 2001 census population is projected to 2006 by the use of the Cohort Component Method taking into account an estimated number of net migrants by age, sex and citizenship. These migration estimates rely on figures obtained by the application of indirect methods to official statistics of Greece of the last intercensal period (Tsimbos 2008). The projection methodology was applied separately to the Greek and the foreign resident population. Since there are no estimates of mortality by citizenship, the underlying estimation process assumes that the 2001 national life tables for Greece express the mortality levels of both Greek and migrant populations. In estimating the population aged 0-4 it is considered

that Greek and migrant women contribute to the births of the interval (2001-2006) according to their age-specific fertility rates estimated for 2005 (see below). Some minor adjustments were made so that the estimated number of births conforms to the total livebirths recorded. The final size and structure of the population for 2005 was obtained by interpolation.

2.3 Fertility rates

The vital registration data (2005) combined with the estimated population (mid-2005) allows the calculation of conventional period fertility indices. The core calculations refer to the Greek and to the foreign populations of the country (all citizenships combined). An attempt is made to estimate the respective fertility rates for Albanian and Bulgarian immigrants. Their age distribution is approximated on the basis of records of the Greek Ministry of the Interior on the total numbers of applications the aforementioned citizens (December 2004) for obtaining residence permits. These figures are well above the respective counts of the 2001 census so that they can be considered acceptable. The distribution of the Albanian and Bulgarian migrants by age has been obtained assuming that their relative age-sex composition in 2005 has not differentiated from the one depicted by the 2001 census.

2.4 Population projections

The medium term demographic effects of immigration and of migrant and native fertility on the population of Greece are sketched out by the application of population projections using the cohort component method. As large-scale immigration is a recent phenomenon in Greece it seems more reasonable to examine medium term population changes rather than longer term outcomes. Thus the estimation process extends over the period 2005-2025 and is carried out in four five-year intervals.

Three a priori assumptions underlying the projection methodology are made. First, the survivorship ratios prevailing in each projection interval are based on the national life tables for Greece. It is assumed that the expectation of life at birth between 2005 and 2025 will show a slight improvement and will gradually rise from 75.5 to 76.1 years for males and from 81.1 to 82.0 years for females, respectively. These changes represent 60% of the improvement in life expectancy observed during the period 1990-2005.

Second, with respect to migration, population projections are formulated on absolute numbers of net migrants classified by age, sex and citizenship, taking into account that half of migrants move at the beginning and the other half move at the end of each projection interval. Three assumptions concerning migration are considered. First, that the net inflows will remain constant as over 2001-2005 (60,000 persons per year, 88% of foreign and 12% of Greek ancestry). Second, that the Greek economy will not be able to accommodate such an influx of foreign workforce so that the national immigration policies will result in a gradual decrease in the number of immigrants reaching in the last projection interval 50% of the initial intakes. The third assumes zero future migration and it is of theoretical interest rather than a plausible scenario.

Finally, concerning fertility, there is only one assumption regarding the indigenous population: its total fertility rate remains constant at the level of the baseline year (2005). This seems reasonable considering the declining trends in the childbearing intensity of the population of Greece (Bagavos et al. 2008) and the fertility prospects as assessed for the EU region (Bijak et al. 2008; Coleman 2005). On the other hand, there are two assumptions concerning immigrant fertility. The first considers constant migrant fertility at the 2005 level (see next section), and it is regarded as a "high" variant scenario. The second one (gradual decline) relies on the experience of countries with long migration history suggesting that fertility of immigrants tends to converge to the levels of the native population (Sobotka 2008; Dubuc 2008; Kahn 1994).

The results of the aforesaid population projections are then obtained under five alternative scenarios based on a combination of different fertility and migration assumptions. As there are no separate mortality assumptions made for the natives and the migrants, the outcome of the projections is sensitive only to the assumed fertility differentials between the indigenous and foreign populations and the volume of future immigration. A critical appraisal of the assumptions and their possible effects on the projected figures is presented in the discussion section.

3. Results

According to the vital registration data, during 2005 there were recorded in Greece 107,545 births. Immigrant births (17,733) represented a considerable share (16.5%) of the total number; the remaining 83.5% (89,812 births) is assigned to Greek women. Over 60% of the migrant births are attributed to Albanian and an additional 6% to Bulgarian mothers; other ethnic groups having at least a 2% share in the births recorded to foreign citizens are Romanians (5.5%), Ukrainians (2.9%), Russians (2.5%), Georgians (2.3%) and Polish (2.1%). First births represent 50% and 47% of the total among migrants and natives respectively.

3.1 Baseline population and fertility rates by citizenship

Table 1 presents summary population estimates for Greece by broad age groups, sex and citizenship for 2005 together with the respective data enumerated by the 2001 census, for comparative purposes. Detailed estimates for the Greek and the foreign citizens as well as for the Albanian and Bulgarian migrants are shown in the appendix (Tables A1 and A2).

Table 1 Resident population of Greece by broad age groups, sex and citizenship: mid-2005 estimates and 2001 census data.

Numbers and age groups	Greek citizens			Foreign citizens			Total Greece		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
<i>Mid-2005 estimates</i>									
Total	4986914	5175532	10162446	548794	455180	1003975	5535708	5630712	11166420
(%)									
0-14	15.1	13.8	14.4	18.4	20.0	19.1	15.4	14.3	14.9
15-64	67.6	65.2	66.4	78.5	75.8	77.3	68.7	66.0	67.3
65+	17.3	21.0	19.2	3.1	4.2	3.6	15.9	19.7	17.8
All ages	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>2001 population census</i>									
Total	4997874	5174032	10171906	415552	346639	762191	5413426	5520671	10934097
(%)									
0-14	15.8	14.4	15.1	16.0	17.5	16.7	15.8	14.6	15.2
15-64	68.1	66.4	67.2	81.0	78.4	79.8	69.1	67.1	68.1
65+	16.1	19.2	17.7	3.0	4.1	3.5	15.1	18.3	16.7
All ages	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

It is estimated that the population of Greece in 2005 is 11,166,420 persons implying an annual growth rate of 0.53% for the period 2001-2005. The increase in the total population is almost exclusively due to immigration. Migrants account for just over one million representing 9% of the population of the country (the respective share in 2001 was 7%). Between 2001 and 2005, the number of the Albanians increased by 37% (from 438,036 to 601,838) and the number of the Bulgarians by 135% (from 35,104 to 82,572). According to these results, Albanians represent 60% of the migrant population (57.5% in 2001) and Bulgarians 8.2% (4.6% in 2001). With respect to age structure, a small but visible increase is revealed in the proportion of aged persons among the Greek population and of young persons among the immigrants.

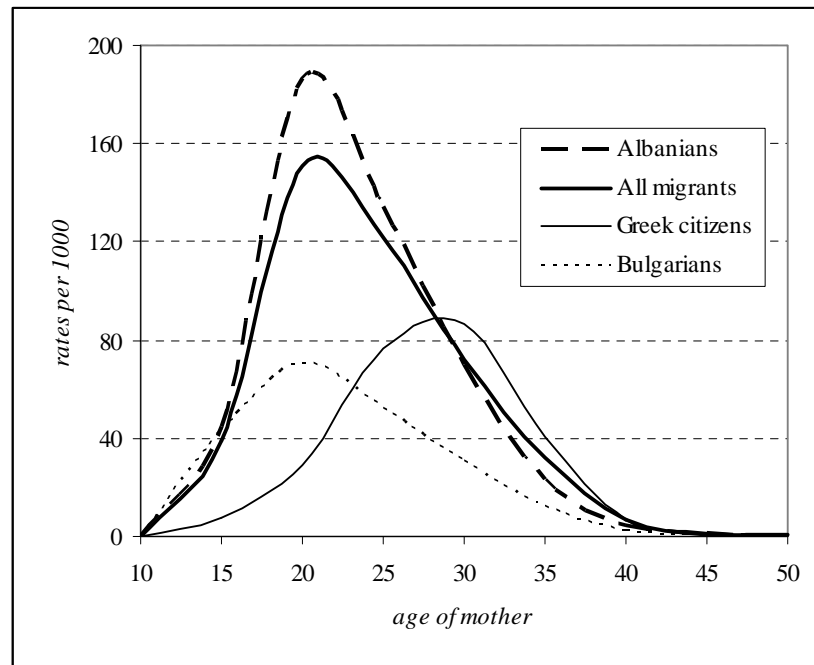
Table 2 presents the fertility rates estimated for Greek and foreign citizens. The analysis shows noticeable differences in both the levels and the age pattern of fertility. The total fertility rate (TFR) is 1.24 births per woman for the natives and 2.12 for the migrants (all citizenships combined). Up to the age of 30, migrant fertility rates significantly exceed the respective rates of the native population while the reverse is found thereafter (Figure 1). Compared to the Greek population, migrants exhibit an early-peak age curve of fertility, comparatively low mean age of childbearing (26.7 years) and high contribution (73.7%) of young women (aged 15-29) to the overall fertility. Greek women, on the other hand, show a very late-peak age curve with their rates reaching a maximum in ages 30-34. The contribution of young ages to fertility is relatively low (45.6%) whereas almost 35% of the gross total fertility of the Greek population results from births to women aged between 30 and 35. With respect to the two selected ethnic groups, Albanian migrants exhibit the highest fertility (2.31 per woman) and Bulgarians the lowest (1.11 per woman).

Table 2 Age specific fertility rates, total fertility rates (TFR), mean age of childbearing and relative contribution of women aged 15-29 to the overall fertility by citizenship: Greece 2005.

Age group	Total Greece	Greek citizens	Foreign citizens	Albanian citizens	Bulgarian citizens
15-19	10.3	7.5	39.3	44.3	43.7
20-24	41.1	29.3	151.0	186.5	70.5
25-29	81.9	76.6	121.8	133.7	52.1
30-34	84.8	86.6	71.9	69.7	35.0
35-39	39.7	40.6	31.9	23.1	16.8
40-44	7.0	7.1	6.9	4.6	2.5
45-49	0.7	0.8	0.4	0.3	0.3
TFR	1328	1242	2116	2310	1105
Mean age	29.9	30.5	26.7	25.9	25.7
(15-29) %	50.2	45.6	73.7	78.9	75.3

Note: all rates are expressed per 1000 women

Figure 1 Age specific fertility rates per 1000 women by citizenship: Greece 2005.



Comparing the age-specific fertility rates by order of birth (Table 3) the difference of the age-pattern between Greeks on the one hand and Albanians and Bulgarians on the other, seems accentuated further. Albanian migrants have the lowest mean age at first birth (23.8 years) and are followed with a half year difference by the Bulgarians. By contrast, second and third births occur earlier for Bulgarians. Greek women have their births later than the other groups (their average age at childbearing is 30.4 years) and the differences are particularly pronounced for first birth order.

Table 3 Age specific fertility rates, total fertility rates (TFR) and mean age of childbearing by birth order and citizenship: Greece 2005.

Age group	Greek citizens			Albanian migrants			Bulgarian migrants		
	Order 1	Order 2	Order 3+	Order 1	Order 2	Order 3+	Order 1	Order 2	Order 3+
15-19	5.3	1.6	0.5	38.9	4.7	0.7	31.9	10.4	1.4
20-24	18.5	8.1	2.7	122.7	58.4	5.4	38.8	22.3	9.4
25-29	42.4	26.6	7.6	43.2	77.8	12.7	25.0	19.1	8.8
30-34	36.7	37.2	12.8	13.9	42.7	13.1	12.3	14.0	8.0
35-39	12.5	17.8	10.4	5.5	12.0	5.6	6.8	5.9	4.1
40-44	2.4	2.5	2.2	1.9	1.2	1.5	0.9	0.8	0.8
45-49	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.1
TFR	590	471	181	1131	984	196	580	363	163
Mean age	29.2	31.2	32.6	23.8	27.6	30.3	24.3	26.5	28.5

Note: all rates are expressed per 1000 women

3.2 Population projections by citizenship

Table 4 shows a summary of the population projections based on five different scenarios. In order to present the figures in a concise and economical way, only the estimates for the baseline (2005) and the target year (2025) are included. The results show that if native and migrant fertility rates remain constant at current levels (2005) without any further migration intakes the total and particularly the Greek native population will be declining and ageing rapidly (scenario 1). Under these conditions the elderly dependency ratio is expected to show a significant rise from 26.4 (2005) to 34.0 (2005) aged persons per 100 working age population.

Table 4 Summary of population projections of the population of Greece: baseline (2005) and projected population in the target year (2025) by citizenship, broad age groups and sex ratio (males per 100 females).

Alternative Scenarios	Ethnic group	Numbers (all ages)	Percentage distribution by broad age groups			Sex ratio	% by ethnic group	
			0-14	15-64	65+			
			<i>Baseline population: 2005</i>					
	Total	11166420	14.9	67.3	17.8	98.3	100.0	
	Greek	10162446	14.4	66.4	19.2	96.4	91.0	
	Migrant	1003975	19.1	77.3	3.6	120.6	9.0	
			<i>Target population: 2025</i>					
<i>Scenario 1.</i> Native TFR: constant Migrant TFR: constant No migration	Total	10357884	12.2	65.6	22.2	97.7	100.0	
	Greek	9171982	11.7	64.8	23.5	95.7	88.6	
	Migrant	1185902	16.2	71.7	12.1	114.5	11.4	
<i>Scenario 2.</i> Native TFR: constant Migrant TFR: constant Net migration: constant	Total	11593546	13.0	66.7	20.3	102.0	100.0	
	Greek	9297036	11.5	65.2	23.3	96.1	80.2	
	Migrant	2296510	19.0	73.0	8.0	129.7	19.8	
<i>Scenario 3.</i> Native TFR: constant Migrant TFR: declining Net migration: constant	Total	11479152	12.1	67.4	20.5	101.9	100.0	
	Greek	9297036	11.5	65.2	23.3	96.1	81.0	
	Migrant	2182116	14.8	76.9	8.4	131.1	19.0	
<i>Scenario 4.</i> Native TFR: constant Migrant TFR: constant Net migration: declining	Total	11261407	12.7	66.5	20.8	101.0	100.0	
	Greek	9256728	11.5	65.1	23.4	96.0	82.2	
	Migrant	2004679	18.3	73.0	8.7	128.0	17.8	
<i>Scenario 5.</i> Native TFR: constant Migrant TFR: declining Net migration: declining	Total	11164033	12.0	67.1	20.9	101.0	100.0	
	Greek	9257095	11.5	65.1	23.4	96.0	82.9	
	Migrant	1906937	14.0	76.8	9.2	129.3	17.1	

The second scenario relies upon the assumption that the TFR of the Greek and the migrant populations will remain at current levels (2005) and that net migration inflows will be maintained the same as in 2001-2005. Under these conditions the population is expected to show comparatively high rate of increase and relatively low pace of ageing. The results also show that the share of the foreign-origin population will rise from 9.0% (2005) to 19.8% (2025) and that the sex ratio of the population is going to increase from 98.3 (2001) to 102 (2025) males per 100 females.

The results of the analytical projections indicate that, at least in the medium run, the demographic effects on the expected population are more sensitive to assumptions about migration than on the supposed variations in future childbearing. Changes in immigrant fertility do not greatly affect the projection outcome (scenario 3) while reductions in migration intakes (scenario 4) result in an almost negligible rate of population growth (0.04% per year) and a relatively high pace of ageing. The final scenario which incorporates declining fertility rates and migration inflows (scenario 5) simply intensifies the unfavorable demographic consequences.

4. Discussion and conclusion

Since the early 1990s Greece has experienced unprecedented population intakes – still ongoing – resulting in significant changes in the socio-demographic milieu of the country. According to the estimates of this study, in 2005 migrants represented 9% of the total population implying that between 1991 and 2005 the share of the foreign residents increased by 5.6 times.

The proportion of births assigned to migrant women provides an indication of the importance of immigration to the overall childbearing of the population. Since 2001 the recorded number of livebirths in Greece has been gradually increasing. To a certain extent, it is suspected that this upward trend is attributable to foreign residents of the country. According to the official records, in 2005 immigrant births represented 16.5% of the total number. This is a considerable share compared to other European countries with much longer immigration history (Sobotka 2008). In this context, two questions need to be addressed. The first one is related to whether immigration has had a significant short-term effect on the overall fertility rate of the population. The second question concerns the extent to which migrant fertility and immigration can, on certain assumptions, affect future population growth and structure.

Using vital registration data by citizenship (2005) this paper applies demographic techniques to portray fertility differentials between the indigenous and foreign-origin populations and sketches out the effect of both migrant and native fertility and of immigration on prospective population developments. As Greece is a country with a short immigration history, the paper is limited on first generation migrants and deals with fertility differentials between ethnic groups rather than changes over time. Although the reproductive behaviour of immigrants is a time dependent phenomenon (Alders 2000; Andersson 2004; Fokkema et al. 2008), the very nature of the existing statistical information does not allow the study of such aspects at present. This will become possible once more data become available.

4.1 Fertility perspectives

In this study the levels and age-patterns of fertility of the native and the migrant populations are evaluated on the basis of conventional period measures. It is well known that the total fertility rate is an aggregate synthetic index providing (under certain assumptions) an idea of the ultimate childbearing outcome achieved throughout the women's life course. It has been argued, however, that the use of the TFR in immigrant populations is not appropriate since it does not take into account the time (and consequently the age) at migration of the women (Morgan et al. 1999; Toulemon 2004; Andersson 2004; Sobotka 2008). Despite these

drawbacks, the TFR has been widely used in many relevant research situations as a measure of short-term childbearing levels (Hoem 2008). Although period data may not be suited for obtaining a thorough grasp of the time dependent aspects of immigrant fertility (Alders 2000; Andersson 2004), the period measures carry into suitable results for policy purposes and, in contrast to census data, are appropriate for investigating the dynamics of the childbearing process (Ford 1990; Ng and Nault 1997).

The results of this study reconfirm that migrants have earlier childbearing and higher fertility than natives. The TFR of the foreign-origin population is 2.12 while the respective figure of the indigenous population is well below replacement level (1.24). This excess can be partly explained by differences in the age composition and age patterns of fertility. Immigrant women have an age structure more favorable for the childbearing outcome and a mean age of fertility schedule almost four years lower than that of the Greek women. But despite the fact that immigrant births represent a relatively high proportion of the total, the higher fertility of migrants has only a slight impact on the national average, raising the TFR from 1.24 to 1.33, i.e. 0.09 children. The reason for this small contribution to the overall fertility is that migrants represent only 9% of the country's population and 10.8% of the total number of women of reproductive age; similar findings have been also reported for France (Toulemon 2004), the Netherlands (Fokkema et al. 2008) and some other European countries (Sobotka 2008). Whether the fertility of immigrants will remain at such high levels in the future is unknown. Predicting future immigrant reproductive behaviour is very difficult due to numerous socio-cultural factors and interactions involved. However, a reasonable guess might be that immigrants in Greece will probably follow the experience of most foreign populations of other countries and gradually approach the native levels. On the other hand it seems doubtful for the Greek population to increase its fertility on a grand level in the near future. The persistence of very low and very late fertility, apart from their purely demographic consequences, are claimed to be characteristics of the Second Demographic Transition (van de Kaa 2001) foreshadowing continuation of these conditions.

With respect to the ethnic groups under investigation, there are two findings that may be pointed out. First, the gradient of the fertility levels across the Albanian, Greek and Bulgarian mothers are maintained in both the period rates estimated by the present study and the cohort measures (average number of children ever born alive) obtained on the basis of the 2001 census of Greece. Second, the comparison of the total fertility rates achieved in Greece to the respective rates observed in the countries of origin shows that the Albanian and Bulgarian immigrants in Greece maintain more or less the same childbearing levels (Table 5).

Table 5 Average number of children ever born (CEB) and period total fertility rates (TFR) by ethnic group in Greece and the respective countries of origin.

Ethnic group	Levels in Greece		Country of origin
	CEB ^(a)	TFR ^(b)	TFR
Albanian	2.50	2.31	2.20 ^(c)
Greek	1.93	1.24	-
Bulgarian	1.71	1.11	1.10 ^(d)

(a) Based on the 2001 census of Greece, 1950 cohort (Bagavos et al. 2008)

(b) Rates estimated for 2005 by this study

(c) Rate in 2002 (Gjonca et al. 2008)

(d) Rate in 2001 (Koytcheva, E. and D. Philipov 2008)

4.2 Population prospects

The new material presented in this study allows incorporating fertility rates separately for the native and foreign populations in the projection methodology. The projections are based on the cohort-component method. This is a well established procedure despite the criticism of some researchers that it tends to under predict, in the long run, the number of births to immigrant mothers (Jonsson and Rendall 2004). The scenarios used in the projections were displayed concisely in previous sections, but an assessment of the particular assumptions is needed to better understand the results.

Mortality assumptions: The majority of migrants to Greece originate from countries with high mortality conditions. There is some evidence that mortality rates of foreign populations in Europe are similar or even lower to those of the respective national-origin populations (Courbage and Khlat 1996; Rogers et al. 1996; Hummer et al. 1999; Brock et al. 2004). However, as already pointed out, this study assumes that the national life-tables of Greece express the mortality conditions of both native and foreign populations. This is common practice in the absence of appropriate statistics (Preston et al. 2001; Coleman 2006; McDonald and Kippen 1999). Furthermore, information deriving from the latest detailed vital registration data of Greece (2005) shows that the number of migrant deaths is very small (1,623) representing only 1.5% of the total deaths recorded. Consequently the calculation of age-specific mortality rates by citizenship is not possible.

Fertility assumptions: The results of this study reveal that immigrants have higher period fertility rates than natives and that there is a gradient of total fertility across Albanian, Greek and Bulgarian mothers. Only two distinct population segments (Greek and non-Greek citizens) are considered. The majority of immigrants to Greece come from countries with higher fertility levels and most of the women (64.4%) are in reproductive ages. If foreign women maintain their old fertility behaviour, the long term effect on the expected number of births will be palpable, but the magnitude of the outcome is subject to a number of factors, mainly the size of the foreign population and their socio-cultural and demographic characteristics. The aggregate immigrant fertility presented in previous sections hides a large heterogeneity between different groups of people and future changes in the ethnic composition may influence the eventual childbearing outcome.

Migration assumptions: Making assumptions about future migration is a very troublesome task due to the limitations of the available statistical information and the lack of widely accepted theory and methodology (Massey et al. 1998; Howe and Jackson 2005). For an immigration country like Greece, assumptions concerning migration are usually formulated in the form of absolute numbers (net migrants) rather than immigration rates (Preston et al. 2001). Apart from the main hypotheses about future immigration stated in the data and methods section, there is also an inherent assumption involved, in that the prospective immigrants have the same relative age-sex distribution throughout the projection period. This condition should be kept in mind when assessing the long term contribution of migrants to childbearing as, according to the literature, the young age structure of immigrants is a more important factor than their fertility rates (Jonsson and Rendall 2004; Keely and Kraly 1978).

Four conclusions can be drawn from the applied projection methodology. First, it is evident that without further migration intakes the population of the country (particularly the indigenous population) will be declining and ageing rapidly. With zero immigration and total fertility at sub-replacement levels – the so-called “coffin scenario” by McDonald and Kippen (1999) – the population of Greece in the medium run (2005-2025) will decline by 7.2%, the working-age population will be shrunk by about 10% and the aged population will increase by 16%. On this assumption the foreign population will also show signs of ageing but its size will continue to grow if immigrant fertility remains at the assumed levels (2.16 children per woman). An increase in the Greek fertility to a plausible level (for instance 1.8 per woman) does not differentiate the picture greatly. It can be estimated that holding the size of the

indigenous population constant requires a gradual increase of the TFR from 1.24 (2005) to 2.69 (2025), an impossible feat for the Greek women as that means returning to the fertility levels pertaining in the early 1950s.

Second, the ageing of the population of Greece over the next years is inevitable and cannot be prevented by future migration intakes. In all scenarios, the Greek population is projected to decline and age apace. On the other hand, immigration has a measurable impact on the growth of the country population, the size of the workforce and the overall age structure, but it cannot offset the ageing process. The findings of this study agree with the results of Bijak et al. (2007), Coleman (2005) and Kippen (1999) obtained for the European countries and Australia. Despite the favorable effect of immigration on the ageing process, it is estimated that between 2005 and 2025 the elderly dependency ratio in Greece will increase from 26.4 to 30.4 and the share of the foreign population will jump from 9% to almost 20%. The last finding deserves attention because, apart from its economic and socio-cultural importance, a high percentage of foreign residents may give rise to xenophobic attitudes (Feichtinger and Steinmann 1992; IOM 2003).

Third, under each set of assumptions immigration has a greater contribution to population growth and structure than fertility. At least in the middle run, the impact of variant levels of fertility does not affect the projection outcome very much, whereas reducing immigration flows yields a measurable impact on the population growth and ageing. Today's age structure of Greece is hardly sustainable, but the problem of ageing seems to be a vicious circle. On the one hand the variations in prospective fertility levels and the efficacy of the relevant policy measures are constrained. On the other hand immigration cannot solve the ageing problem except at very high levels of inflows.

Finally, the concept of the "Replacement Migration," proposed by the UN Population Division (UN 2000) to offset population decline and ageing, is an infeasible solution for Greece. This conclusion is consistent with previous research in other low fertility countries (Coleman 2002; Espenshade 2001; Grant 2001; Bijak et al. 2008). It can be estimated that sustaining the Potential Support Ratio (i.e. the number of working age persons needed to potentially support one person aged 65 or higher) in Greece at the current level (3.9 in 2005) will require 1,000,000 immigrants per 5-year projection interval (4,000,000 immigrants for the period under investigation), clearly an unattainable figure. The calculations of such a hypothetical scenario result in a projected population of 15,380,000 inhabitants, of whom 38% would be of foreign origin. This situation would cause huge changes in the demographic, socioeconomic, cultural and ethnic milieu of the country that could be viewed as the commencement of a Third Demographic Transition (Coleman 2006).

Socio-demographic research carried out in a number of European countries (Kippen 1999; Grant 2001; Coleman 2002; Bijal et al. 2007; 2008) suggests that only a combination of long-term policies aimed at raising fertility and labour force participation rates together with reasonable and effective migration management will help modern societies tackle the long term consequences of the coming demographic changes. This also applies to Greece, but the actions necessary for reshaping the existing reforms should be quick and structural.

Appendix Mid-2005 population estimates for Greece by sex, five-year age groups and citizenship (Tables A1 and A2).

Table A1 Estimated resident population of Greece in mid-2005 by five-year age groups, sex and citizenship: Greek citizens and foreign-origin population (all citizenships combined).

Age group	GREEK CITIZENS			FOREIGN CITIZENS			TOTAL GREECE		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
0-4	240191	228632	468822	44670	41000	85670	284861	269632	554492
5-9	251506	238743	490249	26984	24658	51643	278490	263401	541892
10-14	262445	246495	508940	29280	25605	54885	291725	272100	563825
15-19	295139	271730	566869	34436	27096	61532	329575	298827	628401
20-24	353457	328348	681806	51300	35427	86727	404758	363775	768533
25-29	377935	362228	740163	72234	47425	119658	450168	409653	859822
30-34	374819	371345	746164	75319	51842	127161	450138	423187	873325
35-39	379361	380564	759925	63933	46470	110403	443294	427035	870328
40-44	351975	354395	706371	48186	46319	94505	400161	400714	800875
45-49	349527	357549	707076	36967	38665	75632	386494	396214	782708
50-54	328360	334289	662649	24159	25375	49534	352519	359664	712183
55-59	304058	322003	626061	15438	16787	32225	319496	338790	658286
60-64	258908	290485	549393	9089	9539	18628	267997	300024	568021
65-69	273693	327671	601364	6818	7031	13849	280511	334703	615213
70-74	250321	303919	554240	4681	5002	9683	255002	308921	563924
75-79	185288	240180	425468	2980	3633	6613	188268	243813	432081
80-84	93941	129330	223271	1472	1983	3455	95414	131313	226727
85+	55990	87624	143614	850	1321	2171	56840	88945	145785
Total	4986914	5175532	10162446	548794	455180	1003975	5535708	5630712	11166420

Table A2 Estimated resident population of Albanian and Bulgarian citizens by five-year age groups and sex: Greece mid-2005

Age group	ALBANIAN CITIZENS			BULGARIAN CITIZENS		
	Total	Males	Females	Total	Males	Females
0-4	67216	34939	32277	1698	889	809
5-9	40316	21127	19190	2233	1124	1108
10-14	41374	22120	19254	3356	1705	1651
15-19	43870	26297	17573	4869	2077	2792
20-24	55652	34484	21167	7390	3759	3631
25-29	72418	46430	25988	10928	5055	5873
30-34	71914	45732	26182	11378	4869	6509
35-39	61380	38718	22662	9461	3879	5582
40-44	50809	29583	21226	9969	3505	6464
45-49	37420	21595	15826	8814	2670	6144
50-54	22405	13131	9274	7011	1663	5348
55-59	14222	8015	6207	2814	637	2176
60-64	8037	4249	3788	1138	275	863
65-69	6361	3176	3185	492	181	311
70-74	4081	1936	2144	296	102	194
75-79	2398	1011	1387	215	85	130
80-84	1253	479	774	207	61	146
85+	712	287	425	307	132	175
All ages	601838	353309	248529	82572	32668	49904

References

- Abbasi-Shavazi, M.J., and McDonald, P. (2002). "A Comparison of Fertility Patterns of European Immigrants in Australia with those in the Countries of Origin." *Genus* LVIII(1): 53-76.
- Alders, M. (2000). "Cohort fertility of migrant women in the Netherlands, Developments in fertility of women born in Turkey, Morocco, Suriname and the Netherlands Antilles and Aruba." Working paper presented at the BSPS-NVD-URU Conference, 31 August-1 September 2000, Division Socioeconomic Statistics, Department of Population, Hague: Statistics Netherlands.
- Andersson, G. (2004). "Childbearing after Migration, Fertility Patterns of Fireing-born Women in Sweden." *International Migration Review* 38(2): 747-775.
- Bagavos C, Tsimbos C and G Verropoulou (2008). "Native and Migrant Fertility Patterns in Greece, A Cohort Approach." *European Journal of Population* 24: 245-263.
- Baldwin-Edwards, M. (2004). Statistical Data on Immigrants in Greece, An Analytic Study of Available Data and Recommendations for Conformity with European Union Standards. Report series, Migration Policy Institute, UEHR, Panteion University, Athens: Mediterranean Migration Observatory.
- Bijak, J, Kupiszewska, D., Kupiszewski, M. (2008). "Replacement Migration Revisited, Simulations of the Effects of Selected Population and Labor Market Strategies for the Ageing Europe, 2002-2052." *Population Research and Policy Review* 27: 321-342.
- Bijak, J, Kupiszewska, D., Kupiszewski, M., Saczuk, K., Kicingier, A. (2007). "Population and labour force projections for 27 European countries, 2002-2052, impact of international migration on population ageing." *European Journal of Population* 23: 1-31.
- Billari, F. C. (2005). "Europe and its fertility, From low to lowest low." *National Institute Economic Review* 194: 56-73.
- Brock, A., Griffiths, C., Wild, S., Fischbacher, C. (2004). Mortality by Country of Birth in England and Wales 2001-2003. Paper presented at the 2004 BSPS Conference, British Society for Population Studies. Abstract on line:
<http://www.bsps.org.uk>.
- Coleman, D. (2002). "Replacement migration, or why everyone is going to have to live in Korea, a table for our time from the United Nations." *Philosophical Transactions of The Royal Society, B* 357(1420): 583-598.
- Coleman, D. (2005). "Facing the 21st century, New developments, continuing problems," (pp. 45-56) in *The new Demographic Regime, Population Challenges and Policy Responses* edited by M. Macura, A.L. McDonald and W. Haug . Geneva: United Nations.
- Coleman, D. (2006). "Immigration and Ethnic Change in Low-Fertility Countries, A Third Demographic Transition." *Population and Development Review* 32(3): 401-446.
- Courbage, Y., Khlata, M. (1996). "Mortality and causes of death of Moroccans in France, 1979-91." *Population (English Selection)* 1996(8): 59-94.

- Dubuc, S. (2008). Recent trends in fertility by ethnic and religious groups in the UK. Paper presented at the 2008 BSPS Conference, British Society for Population Studies. Abstract on line: <http://www.bsps.org.uk>.
- Emke-Poulopoulou, H. (2007). *Migration Challenge*, Greek Demographic Society. Athens: Papazisis (in Greek).
- Espenshade, T. J. (2001). "Replacement Migration from the Perspective of Equilibrium Stationary Populations." *Population and Environment* 22: 383-389.
- Feichtinger, G. F., Steinmann, G. (1992). "Immigration into a Population with Fertility below Replacement Level – The Case of Germany." *Population Studies* 46(2): 275-284.
- Fokkema, T., de Valk, H., de Beer, J., van Duin, C. (2008). "The Netherlands, Childbearing within the context of a "Poldermodel" society." *Demographic Research* 19: 743-794.
- Ford, K. (1990). "Duration of residence in the United States and the fertility of US migrants." *International Migration Review* 24(1): 34-68.
- Gabrielli, H., Paterno, A., Strozza, S. (2007). "The Dynamics of Immigrants' Life History: Application to Insertion of Albanian and Moroccan Immigrants into Some Italian Areas." *Population Review* 46(1): 41-45.
- Gjonca, A., Aassve, A., Mencarini, L. (2008). "Albania, trends and patterns, proximate determinants and policies of fertility change." *Demographic Research* 19: 261-292.
- Grant, L. (2001). "Replacement Migration, The UN Population Division on European Population Decline." *Population and Environment* 22(4): 391-399.
- Hoem, J. M. (2008). "The impact of public policies on European fertility." *Demographic Research* 19: 249-260.
- Howe, N., Jackson, R. (2005). Projecting immigration. A survey of the current state of practice and theory. A report of the CSIS Global Aging Initiative. www.csis.org/media/isis/pubs/0504_howe_jacksonprojimmigration.pdf.
- Hummer R., Rogers, R., Nam, C., LeClere, F. (1999). "Race/ethnicity, nativity and US adult mortality." *Social Science Quarterly* 80(1): 136-153.
- IOM (2003). *World Migration 2003, managing migration, challenges and responses for people on the move*. Vol. 2. Geneva: International Organization for Migration.
- Jonsson, S. H., Rendall, M. S. (2004). "The fertility contribution of Mexican Immigration to the United States." *Demography* 41(1): 129-150.
- Kahn, J. R. (1988). "Immigrant Selectivity and Fertility Adaptation in the United States." *Social Forces* 67(1): 108-128.
- Kahn, J. R. (1994). "Immigrant and Native Fertility during the 1980s, Adaptation and Expectations for the Future." *International Migration Review* 28(3): 501-519.
- Keely, C. B., Kraly, E. P. (1978). "Recent Net Alien Immigration to the United States, Its Impact on Population Growth and Native Fertility." *Demography* 15(3): 267-283.
- Kippen, R. (1999). "A note on ageing, immigration and the birth rate." *People and Place* 7(2): 18-22.

- Kohler, H-P., Billari, F.C., Ortega, J.A. (2002). "The emergence of lowest-low fertility in Europe during the 1990s." *Population and Development Review* 28(4): 641-680.
- Koytcheva, E. and D. Philipov (2008). "Bulgaria, Ethnic differentials in rapidly declining fertility." *Demographic Research* 19: 361-402.
- Kulu, H. (2005). "Migration and Fertility, Competing Hypotheses Re-examined." *European Journal of Population* 21: 51-87.
- Massey, D. S., Arango, J., Hugo, G., Kouaouci, A., Pellegrino, A., Taylor, J. E. (1998). *Words in Motion, Understanding International Migration at the end of the Millennium*. Oxford: Clarenton Press.
- McDonald, P., Kippen, R. (1999). The impact of Immigration on the Ageing of Australia's Population. Working paper of the Australian National University, Department of Immigration and Multicultural Affairs, Canberra, Commonwealth of Australia.
- Ministry of the Interior, Public Administration and Decentralization (2007). Legislation concerning the foreign citizens in Greece. State Documentation on line: <http://www.ypes.gr>.
- Morgan, S.P, Botev, N., Chen, R., Huang, J. (1999). "White and nonwhite trends in first birth timing, Comparisons using vital registration and current population surveys." *Population Research and Policy Review* 18: 339-356.
- Ng, E., & Nault, F. (1997). "Fertility among recent immigrant women to Canada, 1991, An examination of the disruption hypothesis." *International Migration* 35(4): 559-580.
- Preston, S. H., Heuveline, P. and M. Guillot (2001). *Demography, Measuring and Modeling Population Processes*. Oxford: Blackwell Publishers.
- Rogers, R., Hummer R., Nam, C., Peters, K. (1996). "Demographic, Socioeconomic and Behavioral Factors Affecting Ethnic Mortality by Cause." *Social Forces* 74(4): 1419-1438.
- Sobotka, T. (2008). "The rising importance of migrants for childbearing in Europe." *Demographic Research* 19(9): 225-248.
- Toulemon, L. (2004). "Fertility among immigrant women, new data, a new approach." *Population & Societies* 400 (April 2004): 1-4.
- Tsimbos, C. (2006). "The Impact of Migration on Growth and Ageing of the Population in a New Receiving Country, the Case of Greece." *International Migration* 44(4): 232-254.
- Tsimbos, C. (2008). "Net migration estimates for Greece by age, sex and citizenship, 1991-2001." *Migration Letters* 5(2): 189-202.
- United Nations (2000). *Replacement Migration, is it a solution to declining and ageing population?*. New York: United Nations Population Division.
- van de Kaa, D. H. (2001). "Postmodern Fertility Preferences, From Changing Value Orientation to New Behavior." *Population and Development Review* 27 (Supplement, Global Fertility Transition): 290-331.
- van de Gaag, N., and van Wissen, L. (2002). "Modelling regional immigration, Using stocks to predict flows." *European Journal of Population* 18: 387-409.

Verropoulou G., Bagavos C. and C. Tsimbos (2007). "Migrant and Non-Migrant Fertility in Greece, Results Based on the 2001 Population Census." *Migration Letters* 4(2): 147-158.