Is replacement migration actually taking place in low fertility countries?

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Abstract

Are migrants replacing "missing" births? We discuss the actual relevance of "replacement migration" in the context of the low and lowest low fertility levels that have emerged in Europe, and subsequently in South-East Asia during the 1990s. After a short introduction on this highly debated topic, we take an empirical perspective with a specific emphasis on birth-cohort replacement migration and working-age population replacement migration. We examine the actual dynamics of the absolute population numbers by birth cohort (independently on the place of birth) in some low fertility, highly developed countries, and we also look at ageing indicators. Subsequently, we investigate more in depth the case of a prototypical lowest-low fertility country, Italy. We conclude that (some) replacement migration is actually taking place, but that the extent varies according to the country.

1. Introduction

During the 1990s, a growing number of countries experienced what was defined as "lowest-low fertility", with a period Total Fertility Rate (TFR) at or below 1.3 (Kohler, Billari and Ortega 2002). In several instances, it has been shown that such TFRs as measures of reproductive behaviour were artificially depressed by tempo effects (see, e.g., Bongaarts and Feeney 1998; Kohler et al. 2002). In fact, at least to a partial extent, lowest-low fertility was explained by the postponement of childbearing (Sobotka 2004). Indeed, recently, in almost all advanced development countries TFRs have increased (Goldstein, Sobotka and Jasilioniene 2009; Myrskylä, Kohler and Billari 2009; OECD 2011). Independently on the determinants of fertility choices within households, and on the demographic determinants – or interpretation – of depressed period TFR, the decline in the total number of births during the years of lowest-low fertility has been massive. Let us mention some examples. The two countries where lowest-low fertility emerged first are Italy and Spain, and some examples from these countries may be useful comparing successive generations (for the sake of simplicity we take 30 years as the distance between successive generations). In Italy, the total number of births was 1.018 million in 1965 (with a period TFR of 2.66). In 1995, 30 years later, the total number of births was practically halved to 526 thousand (TFR=1.19). In Spain, the total number of births was 676 thousand (TFR=2.94) in 1965. In 1995, the total number of births was 363 thousand (TFR=1.18), practically halved, as in Italy. As a point of comparison, Germany's births decreased from 1.325 million (TFR=2.50) in 1965 to 765 thousand (TFR=1.25) in 1995. In France, births decreased from 866 thousand in 1965 (TFR=2.84) to 730 thousand (TFR=1.71) in 1995. In the United States, births increased from 3.76 million (TFR=2.91) in 1965 to 3.9 million (TFR=1.98) in 1995. While the number of births is clearly affected by the age structure of a population in a given moment, the mere implications of the total number of births are of massive importance for actual populations.

We start from the point of view that the actual, absolute, number of births is a key determinant of population dynamics. The size of the labour force is linked to the working age population, and this is in turn linked to births happened roughly between 20 and 65 years earlier. Population aging, as measured by the ratio of the elderly to the working age population is strongly influenced by the dynamics of births (and deaths, i.e. longevity). Nevertheless, migratory movements play a potentially crucial role in this dynamics. The extent to which this role is relevant is debated, and might depend on the time span, and on the spatial scale, taken into account. The broad label for the debate on the role of migration in "replacing" missing births has been "replacement migration". This label was originated by a well-known report of the United Nations (UNDP 2001). A series of simulations in the UN report clarified that, while old-age dependency ratios as indicators of an aging in the structure of a population are bound to increase independently on the size of migratory flows in very low and lowest low fertility countries, migratory flows could contribute to the stationarity of the total population size and the working-age population (see also the critical account of Espenshade (2001)). The emphasis on different kinds of indicators and/or time perspectives explains why some scholars are particularly skeptical on the fact that immigration can "replace" missing births in very low and lowest low fertility societies (Coleman 2002; Keely 2001). Other scholars seem to indicate that adopting a broader perspective, immigration is a necessary, albeit partial, replacement to missing births in population dynamics (Espenshade 2001; Lesthaeghe 2002; McDonald and Kippen 2001; van Nimwegen and van der Erf 2010). As a preview of our findings, we shall conclude that (some) replacement migration is actually taking place, but that the extent to which that happens varies according to the country.

In what follows, we discuss the link between lowest-low fertility and (subsequent) migration in the light of the replacement migration debate. In particular, we want to investigate empirically whether some form of replacement migration has actually taken place during the most recent year, as a homeostatic response to lowest low fertility rates and the massive decline in the number of births that we mentioned earlier. The remainder of the paper is structured as follows. In Section 2 we examine the dynamics of the actual population size by birth cohort in some selected highly developed countries. In Section 3 we analyse in depth the case of Italy as a prototypical lowest-low fertility country. Section 4 contains some concluding remarks, by also looking at the global scale, and we discuss ideas for further research.

2. Birth cohort in highly developed countries

We now focus on birth-cohort size. More specifically, we examine five-year birth cohort size at a given point in time, independently on the place of birth. Without considering mortality, in countries with a prevalence of out-migration, birth-cohort size should diminish over time, as individuals who are born within the country move abroad. Conversely, in societies with a prevalence of in-migration, birth-cohort size should increase over time, as individuals who are born abroad immigrate. To us, this is really what the idea of *replacement migration* should be concerned about, if we want to emphasise the word "replacement". A very simple approach indeed, but it relates fundamentally to the following key question: will people aged e.g. 30 at time t be "replaced" by a similar number of people aged 30 at time t+30? If that is the case, we observe what can be called *birth-cohort replacement migration*. Linked to this approach is the idea that the whole age group of working age, i.e. aged between 20 and 64, is replaced. This is *working-age population replacement migration*. An alternative criterion, also used by the United Nations, focuses on ageing indicators and in particular on old-age dependency ratios. We shall discuss this, although strictly speaking this approach does not deal with "replacement".

The birth cohort replacement criterion on is consistent with a view that focuses on formal measures of inter-generational replacement (usually called *reproduction* by demographers). For instance, Preston and Wang define the net reproduction rate in the presence of migration, *NRR** as representing "how many daughters would be born, on average, to a cohort of female babies who pass through life and are subject at each age to observed rates of fertility, mortality, and migration" (Preston and Wang 2007:658). A similar approach to replacement has recently been chosen by several authors (del Rey Poveda and Cebrán-Villar 2010; Ortega 2006; Sardon 1991; Smallwood and Chamberlain 2005; Sobotka 2008; Wilson et al. 2010).

We inspect actual empirical indicators (in actual data mortality matters, but we look at ages for which, in the societies we consider, mortality has a minor effect), as available from UN data or forecasts. Table 1 shows the size of the cohort born 1980-84 at ages 0-4 to 45-49 in eight highly developed countries. Table 2 shows the basic indicators of population dynamics for the same countries. Birth-cohort size is compared to the cohort born 1950-54 in 1985 (i.e. their potential mothers). The interval is so that a sufficient amount of data is already available without having to require an important part of population forecasts[1]. If we focus on Italy, we can see that the cohort born 1950-54 is not (yet) fully replaced by the cohort 1980-84 (3,783 thousand versus 3,403 thousand). The dynamics is depicted in Figure 1. However, if the assumptions underlying the UN population prospects are correct, such replacement will almost completely take place by age 50 (albeit the NRR* in the sense of Preston and Wang will still be lower than 100). For Spain, birth-cohort replacement migration is reached already when the cohort 1980-84 reaches the age group 10-14. On the contrary, neither in Germany nor in Japan immigrations have replaced the lower number of births. At a first glance, then, the actual importance of migratory flows shapes the opportunity to replace a lower number of births. While Italy and Spain had important (and new) inflows of migrants during the 1990s and the 2000s, and are projected to continue doing so, migratory flows are much less relevant for Germany and Japan. Surprisingly, also France is not actually replacing births, while this is happening in the United States and the United Kingdom. In South Korea, in spite of low fertility, the number of births was still growing, as a consequence of the age structure of the population.

TABLES 1 AND 2 ABOUT HERE

FIGURE 1 ABOUT HERE

The empirical relationship between birth-cohort replacement and migration is striking, despite the presence of various policies and inflows. In Figure 2, where the analysis is conducted on 21 countries of the European Union, we show an instance in which net migration rates are higher where the replacement of individuals (this time at a distance of 20 years, mimicking labour force entry ages) at birth is lower.

FIGURE 2 ABOUT HERE

As anticipated earlier, much of the discussion—both in the scientific literature and among policy-makers—on the impact of immigration in low fertility societies focuses on something different than actual replacement. The question is whether migration can be a solution to population ageing, as measured for instance by old-age dependency ratios, the standard age structure indicator linked to the "burden" of ageing. This is for instance the focus on David Coleman's article (2002) with the explicit and provoking title "Replacement Migration, or Why Everyone is Going to Have to Live in

[1] Ortega (2006) underlines the advantage of using only retrospective information in computing replacement indicators.

Korea: A Fable for Our Times from the United Nations". A simple answer is "no". There is, however, a "but". We report the forecasts on old-age dependency ratios in Figure 3. Some striking features are noticeable. First, Italy and France are very close to each other, despite the different trajectories of fertility they experienced. Although this trend might not continue in the future, this closeness is indicating that during this time period migration has been a partial solution to ageing induced by lowest-low fertility in Italy, even if we look at the "hard" indicator of old-age dependency. Second, in countries with relatively low immigration during this period, i.e. Germany, Japan and South Korea the growth of the indicator has been clearly faster than in other countries. Third, Spain, with its lowest-low fertility and high immigration has a parallel development as compared to the United States. All countries are ageing, albeit at different paces. Migration, with its quick and massive impact on population numbers, seems to be the distinguishing factor in this pace—Japan, with its low immigration, is leading. Neither Italy, nor Spain. A recent simulation study on demographic change and labour force participation concludes that "The short run demographic future of the Japanese is virtually certain. Little or no immigration, long life expectancy, and a recent history of very low fertility rates will produce a slowly declining population over the next 20 years and a super-aging of the population." (Clark et al. 2010:224)

FIGURE 3 ABOUT HERE

How realistic is replacement migration? The desire to keep a constant old-age replacement ratio is clearly unrealistic, given this indicator simply rises as a consequence of the demographic transition and the subsequent increase in longevity (Chesnais 1990; Lesthaeghe 2002). In order to face the social and economic consequences of population ageing a shift in the age boundaries defining such indicators (e.g. by expanding the working age limit) or a "redistribution of work" across ages are unavoidable (Vaupel and Loichinger 2006), independently on fertility trends. It is not clear at all whether population ageing requires demographic solutions (Espenshade 2001), although the economy clearly needs policies with a specific eye on demographic dynamics (Bloom et al. 2010). However, a more moderate demographic target follows as a consequence of birth-cohort replacement migration: the constance of working age population, or working-age population replacement migration.

In Table 3 we report the flows that are necessary to maintain the age 20-64 population constant[2]. In France, the United Kingdom and the United States the target can be reached with very mild immigration: in the U.S. case, the target is met with one ninth of the immigration actually observed during the two decades 1990-2010. South Korea will still be influenced by the presence of relatively large birth cohort, as lowest low fertility is a later phenomenon (see Table 2). However, if by 2020 there is no increase in immigration, the working-age population is bound to shrink. In Italy and Spain, due to lowest low fertility, continuous immigration is needed. However, the flows are not much higher (for Italy) and even lower (for Spain) than the flows observed during the last two decades. Still different cases are Germany and Japan, two countries in which between 1990 and 2010 the TFR has always been lower than 1.5, and the immigration of children has been almost negligible. In order to avoid a quick reduction in their labour force age population, these two countries will need – during the next two decades – high migratory flows. In Germany, the target would be met with a net immigration of 405 thousand per year, against an average of 270 thousand during the last two decades. In Japan, the target would be met with a net immigration of 580 thousand per year, against an average of 40 thousand during the last two decades. In 2030 Germany

[2] Also in this case one could expand the upper limit of the traditional "working-age population". In principle, this could be accompanied by a rise in the lower limit to, due to the need for longer education. Here we stick to the 20-64 age group for simplicity—the bulk of the argument will still hold by slightly modifying the age range.

will be the country that – in relative terms – will have the greater "need" to replace native-born workers with immigrants (Figure 4). For Japan, despite the absolute numbers are higher, the higher population (130 million in 2011) makes so that working age replacement migration can be reached with a net annual immigration rate of 5 per thousand. This rate is lower than what has been observed during the beginning of the new millennium in Italy and Spain.

TABLE 3 ABOUT HERE

Looking at Figure 4, we can get an overview of the influence of past population dynamics on the need for replacement migration between 2010 and 2029. There are two major insights. First, the growing trends suggests – with the important exception of the United States – that during the next two decades the demographic "pull" factors for immigration will become stronger rather than weaker. Even increased productivity due to larger human capital and a larger labour force participation of women and persons aged 60+ will not help in keeping a dynamic economy if the size of the working-age population decreases by some hundred thousand a year (see, e.g., Prskawetz, Bloom and Lutz 2008). Second, not all countries are equal. For countries having experienced lowest low fertility during the last two decades, the need for immigration will be much more pronounced with respect to countries with higher fertility (Coleman and Rowthorn 2004).

FIGURE 4 ABOUT HERE

3. An in-depth case study: Italy

Italy's TFR had already fallen below 1.5 in 1984, and this rate has since then not yet been reached again, despite a recent upsurge in fertility (Billari 2008; Caltabiano 2008; Caltabiano, Castiglioni and Rosina 2009; Castiglioni and Dalla-Zuanna 2009). During the 1993-2003 decade, the TFR reached the lowest-low level of 1.3 children per woman. At the same time, as described above, among the large countries of the Western world, Italy was second only to Spain with regard to the intensity of immigration. Immigrants have aided in slowing the aging of the population, while they also caused a rapid increase in the current number of stable residents in Italy (which rose from 57 to 61 million in just nine years, from January 2002 to January 2011). This increase was not predicted by forecasting agencies (Billari and Dalla Zuanna 2008).

We here focus on national-level population forecasts. Also looking at the errors of past forecasts, the "high scenario" estimate made by the Italian National Institute of Statistics (ISTAT) seems more plausible with respect to the UN scenarios used earlier (see the ISTAT line in Figure 5). ISTAT population projections hypothesises an average NMR of 3.8 per 1000 during the 2010-2030 period. This is much higher than the one envisioned by the UN, although lower than the actual rate during the 2000-2010 period (5.8 per 1000). If this projection turns out to be true, the 1950-54 birth cohort – who did not have more than 1.6 children per woman – will be easily replaced by their "children" (including immigrants). Indeed, at the age of 40-45, the latter will be 7% more numerous than their "parents". But even this projection may underestimate actual immigration. It is possible to estimate and subdivide by age the number of illegal foreigners living in Italy between 1995 and 2010 (see the IRR line in Figure 5) thanks to annual surveys conducted using a snowball sampling technique, as well as to other data obtainable from recent procedures allowing for partial legalization (ISMU 2010). That said, already by the year 2010, before they reach the age of 25, the "children" are almost as numerous as their "parents."

FIGURE 5 ABOUT HERE

Returning to ISTAT "high scenario" projection, even with regard to the rather small 1995-2000 birth cohorts (children of the large baby boom cohorts born in 1960-74) – born at a time when fertility in Italy was at its lowest – in 40 years the deficit has been more than halved. As for the cohorts born during the first decade of this century (of a rather small group of parents), if the ISTAT hypothesis concerning NMR comes true, then we will likely see the pattern observed for the cohorts born in the 1980s (Figure 6). As the children of the baby boom will all finally leave the working-age population, the need to replace them with sustained immigration will decrease. This is true as long as fertility actually increases during the next decades, for instance reaching in 2030 the TFR value of 1.7, which is embedded both in the ISTAT forecast and in the 2010 UN Population Projections.

FIGURE 6 ABOUT HERE

The phenomenon of replacement migration is not new to Italy. In fact, the cities of the *ancien régime* were commonly characterized by a demographic deficit. Fertility rates in urban contexts were relatively low given the high concentration of single men and women, and this was combined with high levels of mortality caused by abysmally unhygienic conditions and overcrowding. For example, recent studies show that during the 16th century, plague epidemics were largely unheard of in the countryside while they were devastating for many Italian cities, even if the latter rapidly regained in population thanks to an abundant and continual arrival of individuals from the surrounding countryside (Alfani 2011). Even in recent times, particularly during the 1950s and 1960s, a number of Italian regions have experienced considerable replacement migration (Dalla-Zuanna 2006). In the Northwestern regions of Italy, fertility was already quite low (CTFR 1.6-1.8) for the women born during the first half of the 20th century, yet the population has grown. There has also been no dramatic aging thanks to the arrival of thousands of youth and children from (foremost) the North-East-Centre of Italy and (secondly) the South. Given that in the areas just mentioned fertility has been much higher, these migrations have aided in balancing out the generations; the cohort of 1926-30 (the "parents") has been replaced by their "children" (born in 1956-60), with the regions of Piedmont (North) and Sicily (South) showing a pattern of mirror opposites – see Figure 7.

FIGURE 7 ABOUT HERE

Thanks to analytical data on Veneto – the region home to Venice, in North-Eastern Italy, which had an NMR slightly higher than the national average during the first decade of the 20th century – it is possible to observe how replacement migration interacts with the labour market (Veneto Lavoro 2010). During the 5-year period between 2004 and 2008, an average of 65 thousand individuals under the age of 30 were newly employed each year. Of these 65 thousand new jobs, 43 thousand were given to people born in Italy, while 22 thousand went to people born abroad. Twenty-five years earlier, during the years 1979-83, 43 thousand children were born in Veneto each year (almost all from Italian parents), which translated into an average fertility of 1.41 children per woman. If in the period of 1979-83, parents in Veneto had had a sufficient number of children to replace themselves (or 2.10 children per woman), then 64 thousand children would have had to be born: enough to cover, 25 years later, the demand for workers. Instead, twenty-five years later, the missing 21thousand births were "substituted" by the entry of exactly as many foreign-born youth into the labour market. In other words, migratory flows into Veneto have made up for low fertility, insufficient to guarantee the ordinary replacement of older generations. Had this not taken place, the consequences would have been pernicious both for the labour market and for the population itself. First of all, the number of employed individuals would have rapidly diminished (15 thousand workers less a year). In fact, over the course of this fifteen year period, 58 thousand people turned 60 (i.e. more than the average age at retirement) each year in Veneto, so that the 43 thousand newly employed natives of Veneto would not have been enough to substitute them. In addition, the large majority of the newly retired left blue-collar jobs and had relatively low levels of education, compared to more than half of the aspiring new workers who had either a high school or university degree. Secondly, without the new immigrants, the population living in Veneto would have aged much more rapidly. In 2010, the half-a-million foreigners living in Veneto had, on average, 30 years of age, compared to an average of 45 years of age characterizing the four-and-half million Italians.

4. Final remarks

Our findings are relevant for some countries in which fertility decline has been fast. In particular they are relevant for what economist define small and open economies. They have to be small in order to assume that the supply of immigrants is sufficient with respect to the decline in births. They have to be open as restrictive migration policies prevent (to an extent that depends on the ability to actually control immigration) immigrants to replace births. Our analysis of standard population data from highly developed countries and Italy in particular leads to the conclusion that some replacement migration is taking place indeed—however with important context specificity. In Europe, migration rates are correlated with past fertility dynamics. Birth cohorts are almost replaced even in lowest-low fertility countries such as Italy and Spain, as long as a sufficient (and high) flow of immigrants is allowed. This is not solving the issue of aging populations as indicated by old-age dependency ratios, but it is contributing to slow the pace of population aging. In the Italian region of Veneto, immigration has perfectly replaced "missing" births for an exemplary cohort. Where immigration has been restricted, population aging is hitting the most—these are the case of Japan, Germany, and—in the future, South Korea. Replacement migration, however, needs to be fuelled by an adequate amount of migrants coming from higher fertility countries. As the global fertility transition is coming to an end (Bongaarts 2002), several developing countries are experiencing below-replacement fertility (Wilson 2004)—China being the obvious and most important example. Indeed, the bulk of the argument of Myrskylä, Kohler and Billari's 2009 paper is that lowest-low fertility might be a feature of countries that are "emerging". Table 4 displays figures similar to the ones we computed for highly developed countries, focused on regions of the world. Adopting this global point of view, births will over-reproduce their parents' generations—to a massive extent in developing countries except China. The data of table 4 tell us that replacement migration in the countries discussed in Sections 2 and 3, i.e. highly developed societies, could in principle take place as there will be enough individuals—young people—in less developed societies to potentially fill the gap. With NMR similar to those observed in some countries during the 2000-2010 decade, high developed societies can maintain the working-age population constant until 2030. Of course, the old-age dependency ratio will continue to grow, although we have shown that the pace of this growth will strongly depend on migration as well. Moreover, the composition of the population in high-development societies will change, and change slowly, requiring clear policies for the integration (which one has to assume for good) of immigrants (van Nimwegen and van der Erf 2010).

By definition, replacement migration cannot hold indefinitely, as the uncertainty around the pace of the fertility transition is enormous (Alkema et al. 2011), and one could expect that the fertility transition will spread to the poorest societies. The population surplus in developing countries is so large that advanced societies might still be able to keep policies that select replacement immigrants. Indeed, these numbers show the importance of making developing countries really emerge, and exploit this "demographic dividend" (Bloom, Canning and Sevilla 2003). China is a big exception, and in the 2020 decade it will become a country "in need" of replacement migration. It might still be feasible in the short run—obviously replacement migration cannot be simple in the long run for a demographic giant like China.

TABLE 4 ABOUT HERE

What is the future of replacement migration? Demographic homeostasis, an old idea, seems to work where borders are not present (e.g. internal migration in Italy, and now within the European Union), or where borders are too hard to be defended (Italy and Spain). If restrictive migration policies can be enforced, policy beats homeostatis (e.g. Japan and South Korea). It might still be that the world will function in the future will function like the *ancien régime* in Europe, with highly developed areas (cities in the past) having below-replacement fertility and less developed areas (rural areas in the past) having above-replacement fertility and providing replacement migration to the most developed areas. However, as fertility control is widespread, and consistently with the shifting development-fertility nexus (Myrskylä et al. 2009), it might well be that fertility will become higher in more advanced areas, limiting the requirement of replacement migration.

Given the crucial relevance of the topic, further research is clearly needed. This research needs to take into account not only the long-term implications of low fertility, but the path towards the long run. We definitely buy the idea, strongly advocated by Wolfgang Lutz as well as by Peter McDonald and their colleagues, that the educational level, i.e. human capital, needs to enter the standard toolkit of empirical population dynamics (see, e.g., Lutz, Cuaresma and Sanderson 2008; McDonald and Kippen 2001)—this is also the case for replacement migration, and the reconstruction and forecast have been recently built (KC et al. 2010). More research is also needed on the role of replacement migration within the interaction between population and economic dynamics. Recent studies, including those focused on Europe and Japan, only leave migration as a "residual" category (see, e.g., Bloom et al. 2010; Clark et al. 2010)—replacement migration as a demo-economic policy option needs further investigations.

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TABLES AND FIGURES

Table 1. Size of the cohort born 1980-84 (independently on the place of birth) at ages 0-4 to 45-49, and of the cohort born in 1950-54 at the beginning of 1985 at age 30-34. Selected highly developed countries (thousand).

Year	Age	Italy	Spain	Germany	Japan	S. Korea	France	UK	USA
Cohort born in 1980-84									
1985	**0-4**	2,998	2,512	4,145	7,406	3,757	3,807	3,608	18,040
1990	**5-9**	2,981	2,515	4,267	7,459	3,807	3,861	3,634	18,326
1995	**10-14**	3,010	2,554	4,471	7,471	3,727	3,883	3,649	19,243
2000	**15-19**	3,052	2,614	4,588	7,481	3,692	3,928	3,641	20,263
2005	**20-24**	3,178	2,923	4,847	7,483	3,662	3,942	3,924	21,067
2010	**25-29**	3,467	3,329	4,939	7,514	3,646	4,023	4,174	22,069
2015	***30-34***	*3,582*	*3,446*	*4,939*	*7,534*	*3,631*	*4,064*	*4,264*	*22,370*
2020	***35-39***	*3,673*	*3,516*	*4,977*	*7,538*	*3,615*	*4,092*	*4,310*	*22,601*
2025	***40-44***	*3,724*	*3,575*	*4,992*	*7,526*	*3,595*	*4,103*	*4,315*	*22,699*
2030	***45-49***	*3,741*	*3,608*	*4,983*	*7,496*	*3,567*	*4,093*	*4,296*	*22,634*
Cohort born in 1950-54									
1985	**30-34**	3,783	2,497	5,542	9,069	3,116	4,290	3,777	20,131

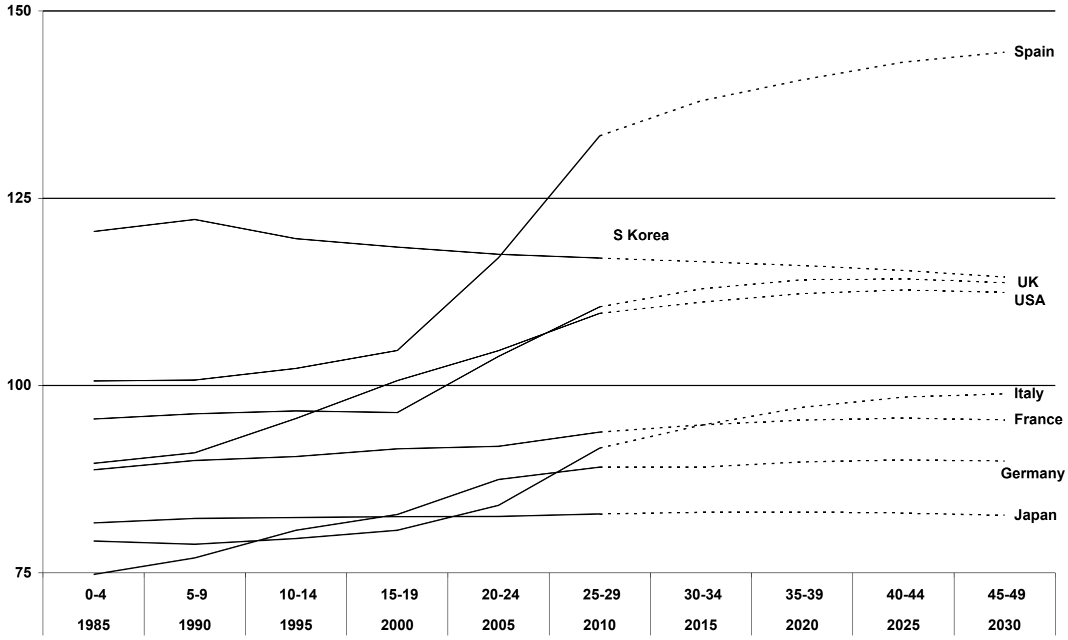
Source. *UN Population Division: population calculated at 1st July of each year (1985-2010) and population prospects, the 2010 variation, medium variant.*
Note: *population prospects are in italics.*

Table 2. Some indicators of population dynamics in 1980-2030. Selected developed countries

	Italy	Spain	Germany	Japan	S. Korea	France	UK	USA
Net Migration Rate (per thousand) – NMR								
1980-1985	0,94	-0,23	-0,28	0,36	1,63	1,06	-0,35	2,80
1985-1990	-0,04	-0,35	4,14	-1,04	2,08	0,99	0,35	3,06
1990-1995	0,54	1,63	8,21	0,73	-2,89	0,43	0,71	3,43
1995-2000	0,79	4,00	2,04	0,03	-2,27	0,64	1,47	6,21
2000-2005	6,41	13,52	1,86	0,08	-0,42	2,55	3,25	4,28
2005-2010	6,71	10,06	1,33	0,43	-0,13	1,62	3,34	3,26
2010-2015	*3,44*	*4,34*	*1,30*	*0,43*	*-0,12*	*1,61*	*3,31*	*3,14*
2015-2020	*2,26*	*4,09*	*1,35*	*0,43*	*-0,12*	*1,50*	*3,05*	*2,87*
2020-2025	*2,17*	*3,84*	*1,36*	*0,44*	*-0,12*	*1,41*	*2,88*	*2,66*
2025-2030	*2,18*	*2,89*	*1,38*	*0,44*	*-0,12*	*1,39*	*2,86*	*2,56*
Total Fertility Rate - TFR								
1980-1985	1,54	1,88	1,46	1,75	2,23	1,87	1,78	1,80
1985-1990	1,34	1,46	1,43	1,66	1,60	1,80	1,84	1,89
1990-1995	1,28	1,28	1,30	1,48	1,70	1,71	1,78	1,99
1995-2000	1,22	1,19	1,34	1,37	1,51	1,76	1,74	1,96
2000-2005	1,25	1,29	1,35	1,30	1,22	1,88	1,66	2,04
2005-2010	1,38	1,41	1,36	1,32	1,29	1,97	1,83	2,07
2010-2015	*1,48*	*1,50*	*1,46*	*1,42*	*1,39*	*1,99*	*1,87*	*2,08*
2015-2020	*1,56*	*1,59*	*1,55*	*1,51*	*1,48*	*2,00*	*1,90*	*2,08*
2020-2025	*1,63*	*1,66*	*1,62*	*1,58*	*1,56*	*2,02*	*1,93*	*2,08*
2025-2030	*1,70*	*1,72*	*1,69*	*1,65*	*1,63*	*2,03*	*1,95*	*2,09*
Life expectancy at birth – e_0								
1980-1985	74,8	75,9	73,8	76,9	67,4	74,8	74,1	74,3
1985-1990	76,3	76,7	74,8	78,5	70,4	76,1	75,0	74,9
1990-1995	77,4	77,4	76,0	79,5	72,9	77,4	76,2	75,6
1995-2000	78,7	78,5	77,4	80,5	74,9	78,5	77,1	76,4
2000-2005	80,2	79,6	78,7	81,8	77,4	79,6	78,4	77,2
2005-2010	81,4	80,5	79,8	82,7	80,0	81,0	79,6	78,0
2010-2015	*82,0*	*81,8*	*80,6*	*83,7*	*80,7*	*81,7*	*80,4*	*78,8*
2015-2020	*82,5*	*82,5*	*81,4*	*84,4*	*81,3*	*82,4*	*81,0*	*79,4*
2020-2025	*83,1*	*83,2*	*82,1*	*84,9*	*81,8*	*83,1*	*81,5*	*80,1*
2025-2030	*83,6*	*83,8*	*82,7*	*85,4*	*82,4*	*83,7*	*82,1*	*80,7*

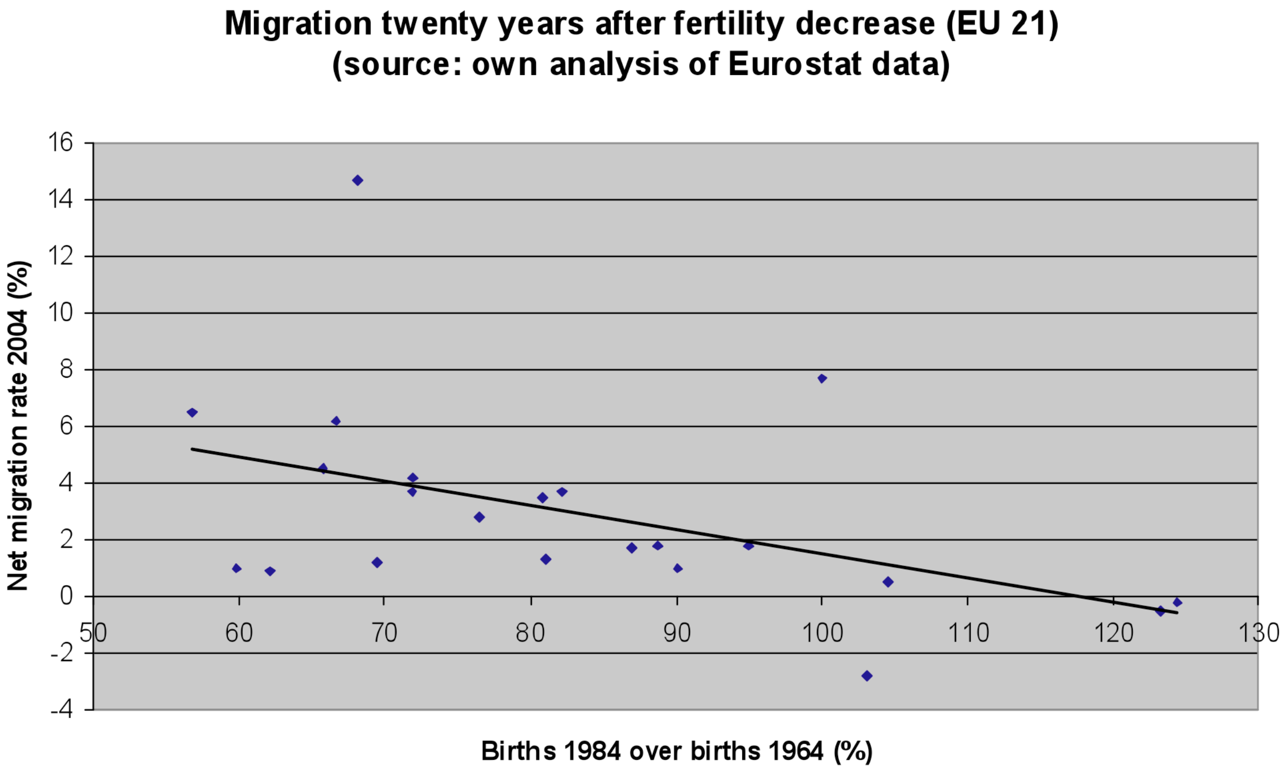
Source. *Population Division of UN: population prospects, the 2010 revision, medium variant.*

Figure 1. Ratio (per 100) between the cohort born in 1980-84 at several years (1985-2030) and ages (from 0-4 to 45-49) and their "parents" (people born in 1950-54, aged 30-34 in 1985). Some selected developed countries



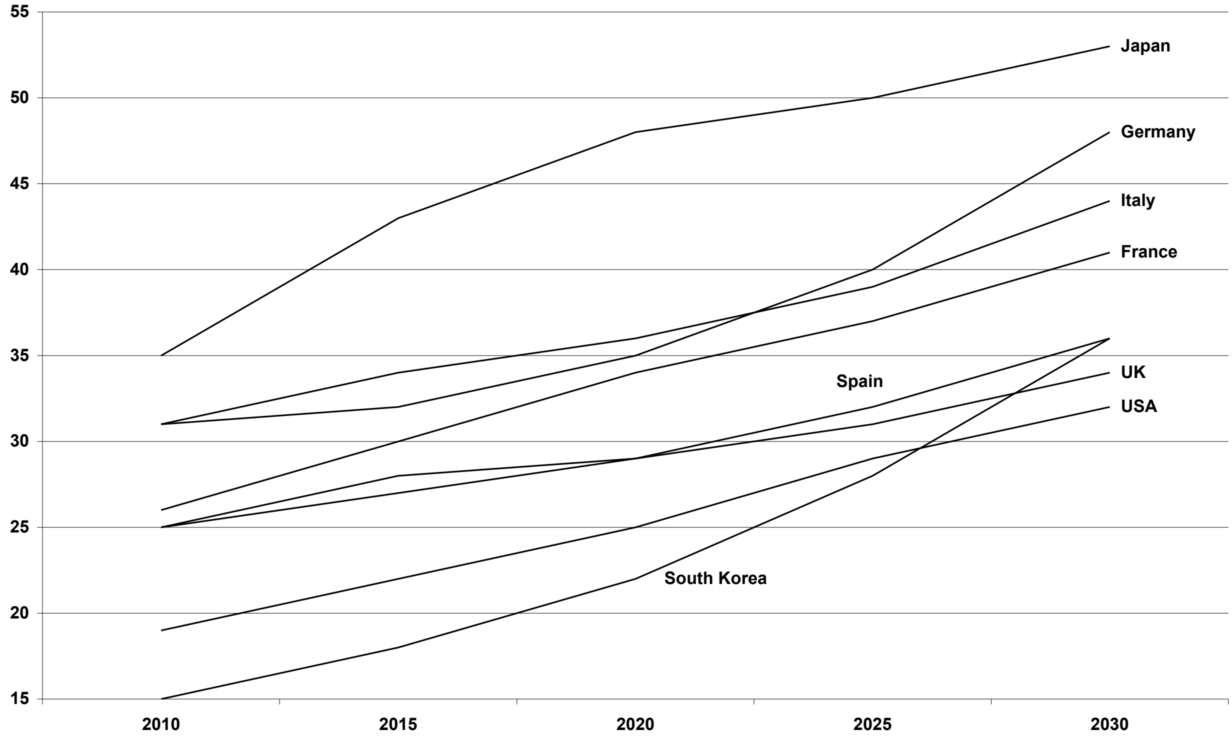
Source: *Own elaboration on UN Population Division data. Population calculated at 1st July of each year (1985-2010) and population prospects, the 2010 revision, medium variant.*

Figure 2. Net migration rates in 2004 as related to the ratio of births in 1984 versus 1964. EU-21 countries.



Source: Billari (2008).

Figure 3. Old-age dependency ratio (ratio between population aged 65+ and population aged 15-64, per 100). Years 2010-30 in selected developed countries



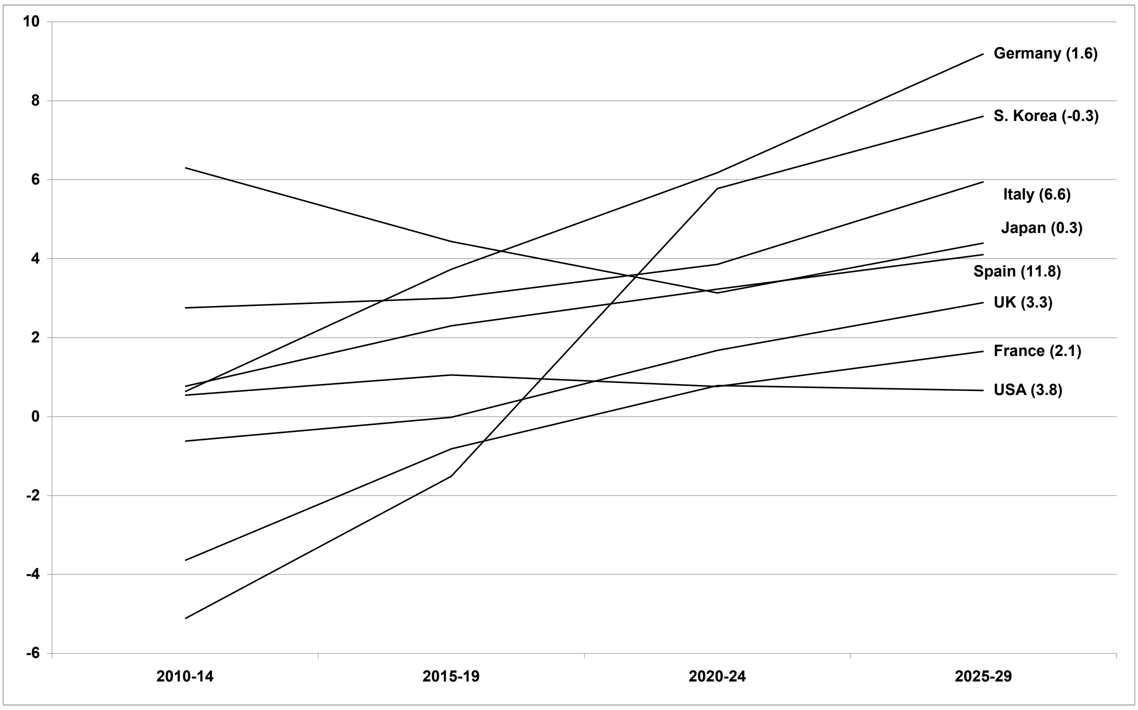
Source. *Population Division of UN: population prospects, the 2010 revision, medium variant.*

Table 3. Net number of immigrants (1985-2010) and net number of immigrants to maintain constant the population aged 20-64 at 1.7.2010 (thousand). Some selected developed countries

Years	Italy	Spain	Germany	Japan	S. Korea	France	UK	USA
1980-85	53	-9	-22	42	63	58	-19	661
1985-90	-2	-14	324	-126	87	56	20	757
1990-95	31	64	661	90	-127	25	41	892
1995-00	45	159	168	4	-103	38	86	1,704
2000-05	371	566	154	10	-20	153	194	1,239
2005-10	400	450	110	54	-6	100	204	991
2010-14	*166*	*35*	*52*	*801*	*-248*	*34*	*-38*	*-1,157*
2015-19	*180*	*104*	*306*	*563*	*-73*	*66*	*-1*	*-260*
2020-24	*232*	*146*	*507*	*398*	*280*	*48*	*104*	*250*
2025-29	*357*	*186*	*754*	*558*	*369*	*104*	*179*	*210*
Mean 1990-2009	212	310	273	40	-64	79	131	471
Mean 2010-2029	*234*	*118*	*405*	*580*	*82*	*63*	*61*	*50*

Source. *Our elaboration on data of Population Division of UN: population calculated at 1st July of year 2010, using the population prospect, medium variant, version 2010*

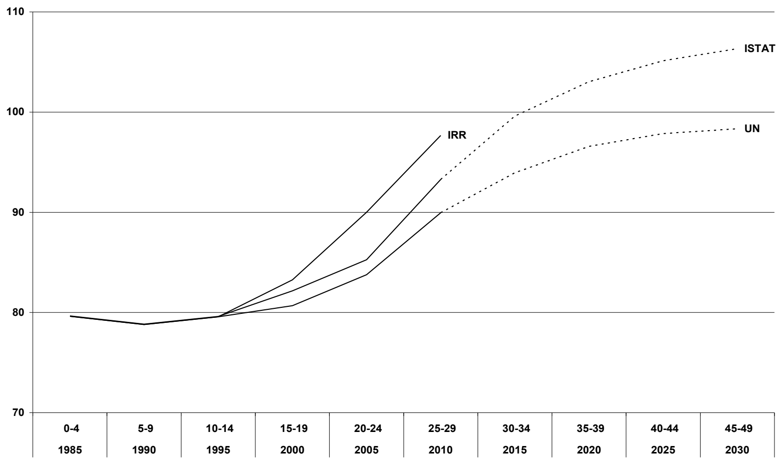
Figure 4. Yearly NMR (per thousand) to maintain constant the population aged 20-64 at 1.1.2010. Some selected developed countries. In parentheses is the medium NMR of each country of years 2000-09



Source. *Our elaboration on data of Population Division of UN: population calculated at 1st July of year 2010, using the population prospect, medium variant, version 2008.*

Note. *The NMR is calculated as the ratio between data of table 4 (the net number of immigrants to maintain constant the population aged 20-64 at 1.7.2010) and the total population at 1.7.2010.*

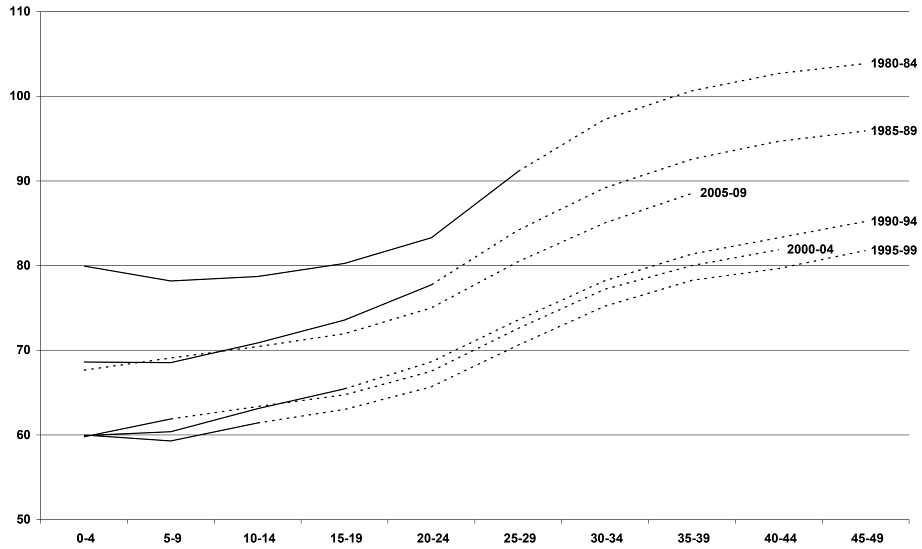
Figure 5. Ratio (per 100) of the cohort born in 1980-84 at several age-groups (from 0-4 to 45-49) during the years (1985-2030) over their "parents" (individuals born in 1950-54, aged 30-34 in 1985). Italy, three different sources.



Sources. UN: Italian population calculated at the beginning of each year (1982-2009) and population projections, the 2010 review, medium variant. ISTAT: Italian population calculated at the beginning of each year (1982-2009) and population projections, the 2008 review (high scenario). IRR: our calculation done by adding, to the ISTAT data, an estimate of the illegal foreigners living in Italy at the beginning of each year during the period of 2000-10 (ISMU).

Note. The dotted lines are also based on population projections.

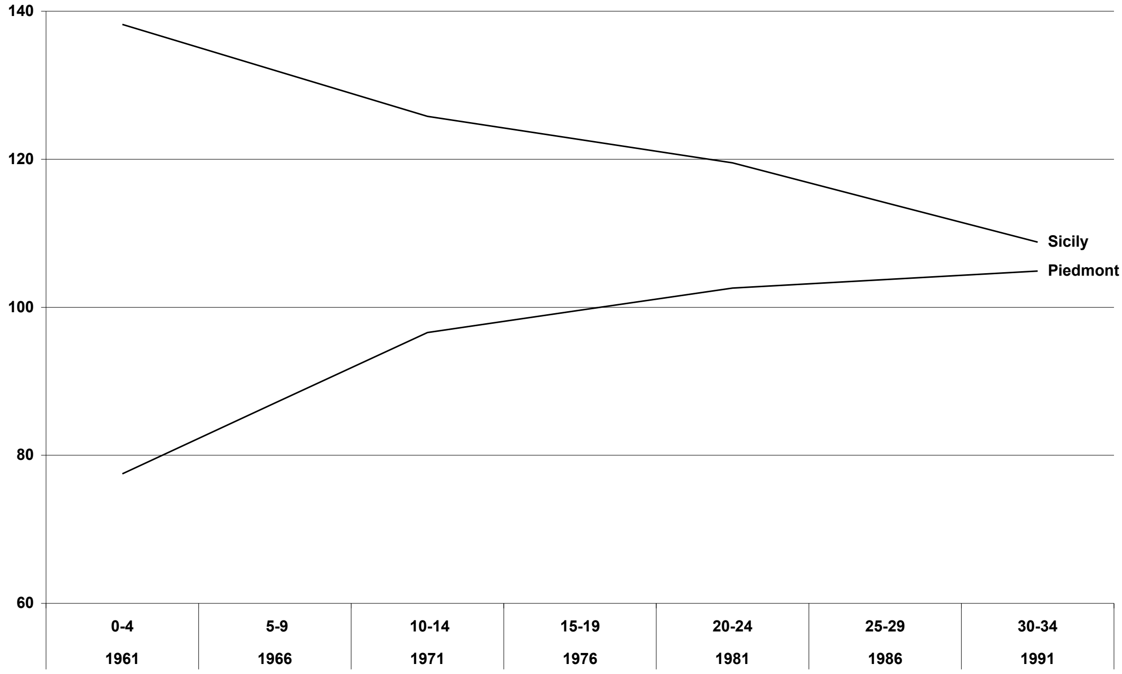
Figure 6. 100 x ratio of the cohorts born between 1980-84 and 2005-09 over several years (1985-2030) and ages (from 0-4 to 45-49) over their "parents" (individuals born between 1950-54 and 1975-79, aged 30-34). Italy.



Sources. ISTAT: Italian population calculated at the beginning of each year (1982-2009) and population projections for 2009 (high level).

Note. The dotted lines are also based on population projections.

Figure 7. Ratio (per 1000) of the cohort born in 1956-60 at several years (1961-91) and ages (from 0-4 to 30-34) over their "parents" (individuals born in 1926-30, aged 30-34 in 1961). The Italian regions of Piedmont and Sicily



Source: *Dalla-Zuanna (2009).*

Table 4. Net number of immigrants and NMR to maintain constant the population aged 20-64 at the level of January 1st, 2010. Comparing developed and developing countries

Years	Developed countries	Developing countries	Developing countries without China	China	World
Net number of immigrants (thousand)					
2010-14	-602	-74,094	-63,864	-10,229	-74,696
2015-19	2,511	-61,784	-58,649	-3,135	-59,273
2020-24	3,970	-57,145	-55,575	-1,570	-53,175
2025-29	4,288	-51,134	-53,630	2,496	-46,847
Net Migration Rate – NMR (per thousand)					
2010-14	-0.5	-13.1	-14.8	-7.5	-10.8
2015-19	2.0	-10.9	-13.6	-2.3	-8.6
2020-24	3.2	-10.1	-12.9	-1.2	-7.7
2025-29	3.5	-9.0	-12.4	1.8	-6.8

Source. *Our elaboration on data of Population Division of UN: population calculated at the beginning of 2010, using the population prospect, medium variant, version 2008.*