J-READING
JOURNAL OF RESEARCH AND DIDACTICS IN GEOGRAPHY
1, 12, June, 2023, pp. 111-117 DOI: 10.4458/5970-09

Forecast of the foreign component in the Italian population to 2050

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Received: January 2023 – Accepted: March 2023

Abstract

Although migrants are young when they arrive, they will age if they are allowed to stay in the destination country. Available data show that the foreign component of the European population is experiencing an aging process even in countries where net migratory gains are substantial. In Italy in the period from 2002 to 2021 the number of migrants aged 65 and over increased from 41 thousand to 274 thousand, the share of over 65s was 3.0% in 2002 and almost doubled in 2021, reaching 5.5%. Studies specifically concerning the demographic forecasts of the foreign population are scarce and can be of great interest as these processes have direct repercussions on the composition of the job offer and inevitable and economic repercussions regarding health and pension spending. For this purpose, the study adopts a stochastic approach based on the properties of the event-point processes which allowed to make forecasts on the overall population residing in Italy by 2050, highlighting the foreign component.

Keywords: Forecast, Model, Migration, Italy

1. Introduction

The process of population ageing that has been underway for several decades, favored by the general increase in life expectancy and the gradual decline of births, is causing imbalances in the population structure with a relentless increase in older cohorts. This dynamic, which is taking place in all European populations, also affects the migratory component of these populations. Although migrants are young when they arrive, they will age if they are allowed to remain in the country of destination. Ageing of these groups is expected to increase across Europe, with few evidence of re-immigration. Available data on the age distribution of the migrant population show an increasing process of ageing even in countries where net migration gains are substantial. In southern European countries, such as Italy, Spain and Greece, substantial migration flows are a relatively recent phenomenon. In Italy, the migration balance has been steadily positive since the early 1990s (Istat, 2022). However, the foreign

population in Italy is also experiencing an ageing process: in the period from 2002 to 2021, the number of migrants aged 65 and over increased from 41,000 to 274,000, the share of those aged 65 and over was 3.0% in 2002 and will almost double in 2021, reaching 5.5%. Studies dealing specifically with demographic forecasts of the foreign population are scarce and may be of great interest since these processes have direct effects on the composition of the labour supply and inevitable and economic repercussions regarding healthcare and pension expenditure. To this end, the proposed study adopts a stochastic approach that will make it possible to make forecasts on the total population resident in Italy by 2050, including the foreign component, focusing on migratory background rather than the citizenship that is an administrative issue.

2. Methods

First of all, it is necessary to premise that making a future projection of the foreign resident population is not conceptually simple since neither the criterion of citizenship nor that of country of birth allows to identify it exactly. In fact, foreign immigrants at the beginning of the migration process constitute the entire target population, but as time goes by, naturalized immigrants and second-generation immigrants must be subtracted from them, as they become more and more relevant and important contingents as the time of stay in the destination country passes (Strozza et al., 2002). To overcome these drawbacks, in our model we will assume that acquisitions of citizenship do not take place during the period considered and, therefore, a foreign citizen remains ad such for the entire duration of stay in Italy.

The methodology used follows a stochastic approach and is based on the properties of point-event processes (Bertino and Sonnino, 2007). The model adopted to simulate the single events with demographic implications (birth, death, emigration, and immigration) is one that refers to the composition of multiple Poisson processes. Through this method it is possible to simulate the evolution of a population, the composition of which is known at a certain instant, by randomly generating the succession of individual events that will occur in each year of the forecast. The entire procedure is repeated for a fixed number of times, generating, for each year of the study, several forecasts of the population structure. In this way, for each year under study and for each population characteristic, the respective mean values and mean square deviations can be calculated, providing an indication of the variability of the demographic measures. The time interval considered here is from the year 2020 to the year 2050, that is a time span to obtain a reasonable prevision also comparable with other available forecast projections.

The procedure requires certain information that is necessary for the calculation of the rate of realization of the events; this includes the structure of the population at the initial forecast instant broken down by gender.

The starting parameters used for the estimates refer to the year 2019 and the source is the Italian National Institute of Statistics (Istat). The choice fell on 2019 in order to avoid the problems associated with the pandemic period, especially when estimating the demographic and probabilistic functions, which will be described below. To forecast future population trends, the procedure requires a forecast scenario for the main demographic aggregates (births, deaths, emigrations and immigrations).

With regard to mortality, gender-specific mortality rates observed from 1960 to 2019 were considered. Then, through the Lee-Carter methodology (1992), a theoretical mortality function was estimated for individual ages and sexes. Through this function, the probabilities of death up to 2050 were estimated. As regards fertility, the structure of future rates has been considered constant, while the number of average children per woman is expected to rise from 1.24 to 1.50, in line with Istat forecast. The estimation of immigration and emigration rates has been made based on Eurostat data on foreign inflows and outflows. From the rates calculated by age and sex, using the Roger-Castro methodology (1981), theoretical which approximate the trend of the observed rates functions have been estimated. Regarding the choice of future flows of immigrants and emigration rates, it was decided to adopt the

same forecasts provided by Istat (2022) through the forecast indicators (median scenario) that is the more likely scenario.

3. Results

3.1 Forecast of the entire population

The results of the forecast of the entire resident population are presented below. Figure 1 shows Italy's resident population in 2019 (colored bars) compared with the forecast to 2050 (transparent bars). The figure shows the evolution of the relentless ageing process of the Italian population with the progressive increase of the older generations. At the same time, the reduction of the population in the younger age groups can be observed. This is caused by two concomitant phenomena: on the one hand the reduced number of average children per woman assumed in the model and on the other hand the progressive reduction in the number of women of childbearing age.

The age pyramid makes it possible to evaluate, in an intuitive and immediate way, the processes taking place. Table 1 includes indicators calculated on the forecasted population that are useful for outlining the dynamics of the processes. The adopted technique allows the possibility of repeating the simulation several times, so that the average value of the indicators and their standard error are calculated. For the sake of simplicity, only the value of the indicators for the starting year 2019, the intermediate year 2035 and the final year 2050 are presented in Table 1. The average age of the population will increase from 45.5 years in 2019 to 49.3 years in 2035. A further increase to 51.5 years in 2050 is expected, that is an increase of 6 years compared to the base year value. The average age at death will also increase by almost 6 years from the current 80.7 years to 86.8 years in 2050. In the projected scenario, it is expected that the current trend of increasing survival caused by technological progress in the field of medical sciences, as well as the overall improvement in living conditions, will continue.

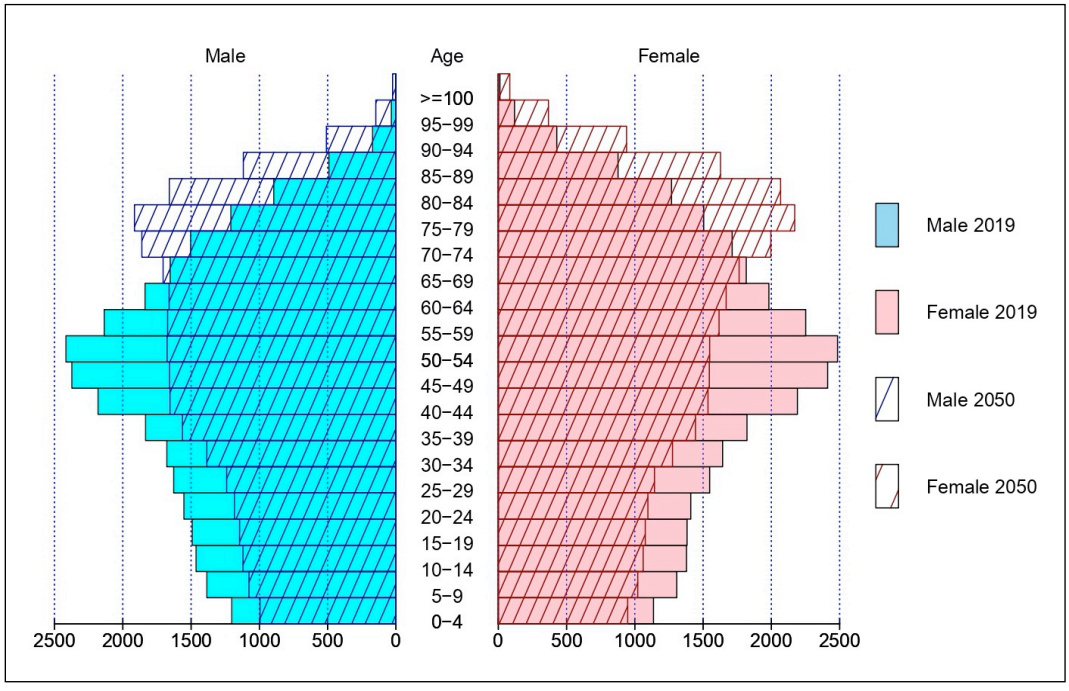

Figure 1. Resident population forecast. Comparison of the years 2019 vs 2050. Authors' elaboration.

Looking at the indicators that are most relevant for the economy, it is interesting to note that the trend in the structural dependency ratio of young people will tend to decrease from 20.6 to 18.9 in 2035. The value of the indicator in 2050 (21.6) suggests that this trend will reverse. In fact, although the generations between 0 and 14 years will decrease overall, from a certain point onwards, there will be a very sustained reduction in the working age population in favour of the older cohorts. This trend will cause a reverse of the indicator with a rising trend. Over the time period considered the index of structural dependency of the elderly will double from the current 35.8 to 69.3, showing that for every three persons of working age there will be two persons aged 65 and over. The structural dependency ratio of the population is also reported. Lastly, the structural dependency ratio of the population is presented: as one might expect, it will increase from the current 56.4 to 90.2, suggesting that in 2050 for every person of working age there will be another person of non-working age.

	2019	2035		2050	
	Indicator	Mean value	Standard error	Mean value	Standard error
Population mean age	45.5	49.3	0.2	51.5	0.7
Dependancy ratio - young age	20.6	18.9	0.3	21.6	0.8
Dependancy ratio - old age	35.8	53.8	0.2	69.3	1.1
Economic dependency index of the population	56.4	72.7	0.3	90.2	1
Mean age at death	80.7	84.2	0.1	86.8	0.1
N.of newborns	401444	408637	16600	377074	22738

Table 1. Main demographic indicators to 2050 (average values and mean square deviations). Authors' elaboration.

The estimated number of births is also presented; our assumptions, in accordance with Istat's (2022) forecasts, predict an increase in the average number of children per woman from 1.21 to 1.50. The consequence would be an initial gradual increase in births (from 401,444 in 2019 to 408,637 in 2035). Subsequently, due to the reduction of female cohorts at younger ages, the number of births will decrease to 377,074 in 2050.

The trend in the total population is expected to decrease from about 59 million in 2019 to an estimated 55 million in 2050. The gradual reduction of the population combined with progressive ageing adds a further demographic problem. Migration flows, from the analysis of the estimates made, play an important role, although not enough to compensate for the existing imbalances.

3.2 Forecasts of foreign population

Through demographic projections it is possible to outline the possible future development of the foreign immigrant population. This is the result of particular scenarios established a priori. Through this projection it is possible to make some considerations on the amount and age composition of the foreign population resident in Italy in 2050. Once the foreign population resident in Italy in 2019 has been selected, the assumptions underlying the proposed model provide for the adoption of the same mortality, fertility and migration parameters previously used, in accordance with the Italian population forecasting model. In particular, the same inflows of immigrants will be assumed. Ultimately, we will assume the demographic characteristics of foreign immigrants and natives to be very similar, which is likely as time goes by, conforming and integrating with the socio-cultural patterns of the hosting country. These choices represent a good approximation of reality, although some important clarifications must be made. Considering the fertility, the literature shows as the reproductive behavior of immigrant women and their migration history are strongly connected and the years spent in the host country should be taken into account. For example, international studies highlight how fertility tends to decrease immediately after the arrival in the host country (Alders, 2000). Moreover, specific surveys on Italy showed that the reproductive behavior of immigrant women changes strongly depending on the country of

origin and the reasons for migration (Mussino and Strozza, 2012). With regard to mortality, depending on the geographical area of origin, both the causes of death and the level of total mortality may vary greatly (Fedeli et al., 2015; Pacelli et al., 2016). It should also be mentioned that, generally, migrants have a greater propensity to emigrate again and to move than natives; this tendency is greater among migrants coming from more remote countries. The approach proposed here is meant to be an experiment compared to the more tested studies already carried out to assess the 'rejuvenation' effect of the migration component on the demographic ageing of a population. In fact, 'what-if' models are generally used that compare a projection model that incorporates migration with another excluding it (Le Bras, 1991; Golini, 1998). Graph 2 compares the two age pyramids of the foreign immigrant population in the year 2019 and its projection to 2050. Based on the described assumptions, the immigrant population grows more than twice as fast overall (from about 5 million to 12.8 million). In addition, the age structure and relations between generations will change. In fact, while in 2019 the foreign population is mainly composed of individuals of working age and children of pre-school and school age, in the near future it will lose this peculiarity and begin to align with the native population. According to estimates, the average age of the foreign population will rise from 34.8 years to 43.6. The dependency ratio of the population will increase from the current 28.4 to 57.0. In addition, there will be a large increase in the cohorts over 65 years of age, which will cause the old-age index to rise considerably (from 25.5 to 145.5). We can therefore conclude by saying that if the assumptions underlying our model are confirmed, the population of foreigners will also be affected by a progressive ageing process.

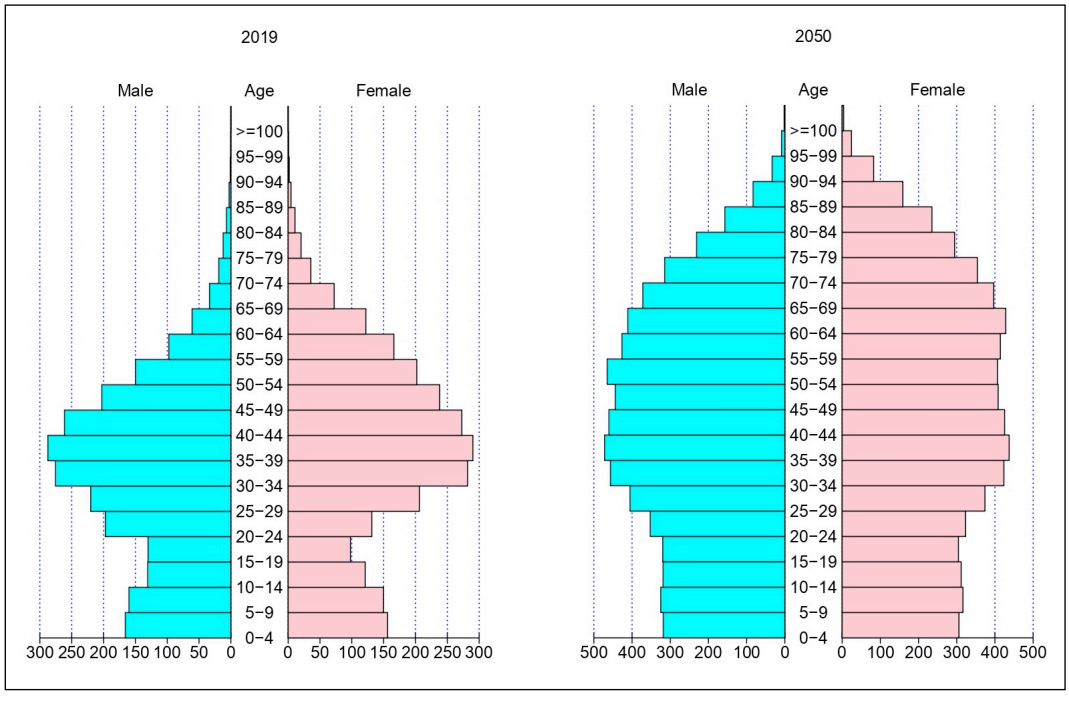

Figure 2. Foreign population in 2019 and its projection to 2050. Authors' elaboration.

4. Conclusions

Forecasting demographic scenarios is of fundamental importance for undertaking policies that safeguard the country's productive and social structure. The Istat produces demographic forecasts for the Italian population with a 50-year horizon and predicts an acceleration in the ageing of the population, which can only be partially offset by an increase in fertility (which is difficult to predict at present) and by new entries of people from abroad. It is more difficult to make forecasts on the migration component. Once the pandemic shock has been overcome, it is assumed that immigration will get the average levels registered in the five-year period 2015-2019 starting from the year 2023. The foreign component has contributed to reducing the decline of the Italian population and particularly the working-age population. By 2036, Italy will lose 3.5 million individuals of working age with -24.7 percent in the 35-54 age group, -7.4 percent in the 15-34 age group, and +17.6 percent of workers in the 55-69 age group (Istat, 2019). In the next years, the migratory balance will be always positive and growing, but not sufficient to compensate for the decrease in population resulting from progressive ageing and the reduction in births.

The forecasts to 2050 produced in this study show a decrease in the resident population with significant ageing, which also concerns the foreign component of the resident population: the dependency ratio among foreigner's resident in Italy would rise from 28.4 to 57.0, values like those of the Italian population observed today.

Among the limitations of the study it is worthwhile to mention the estimated variability of the predicted demographic indicators, that is unexpectedly low, due to the intrinsic hypotheses of the adopted methods. By using different approaches this aspect can be improved. The forecast of the foreign population is affected by the assumptions adopted on the forecast of demographic parameters, which are assumed to be similar to those of the resident population. This trend has been observed in the long run in many countries (Murphy, 2016), and inevitably results in the age structures of the foreign and native population tending to resemble each other.

The results of the prevision can be used to develop knowledge related to population growth in a geographical perspective and interpreted through arguments and assumptions of dominant theories of population change in time and space for didactic purposes.

Acknowledgements

We are thankful of Prof. Salvatore Bertino for his advice in methodological issues.

References

1. Alders M., "Cohort fertility of migrant women in the Netherlands Developments in fertility of women born in Turkey, Morocco, Suriname, and the Netherlands Antilles and Aruba", *BSPS-NVD-URU Conference of New Paths in Exploring and Analysing Demographic Data*, (Utrecht, 31 August - 1 September 2000).
2. Bertino S. and Sonnino E., "A new technique for sthocastic population projections", *Joint EUROSTAT-UNECE Work Session on Demographic Projections*, (Bucharest - Romania, 10-12 October 2007), Luxembourg, European Commission Office for Official Publications, pp. 161-175.
3. Fedeli U., Ferroni E., Pigato M., Avossa F. and Saugo M., "Causes of mortality across different immigrant groups in Northeastern Italy", *PeerJ*, 3, 2015.
4. Golini A. and Strozza S., "The Impact of Migration on Population Growth and its Interplay with Social and Political Issues", *Proceedings of Joint IASS\IAOS Conference on Statistics for Economic and Social Development*, Aguascalientes, 1998
5. Istat, *Futuro della popolazione: meno residenti, più anziani e famiglie più piccole,* Rapporto Previsioni della popolazione residente e delle famiglie, Rome, 2022, https://www.istat.it/it/files//2022/09/REPORT-PREVISIONI-DEMOGRAFICHE-2021.pdf.
6. Istat, *Il mercato del lavoro 2019. Verso una lettura integrate*, Rome, 2020, https://www.istat.it/it/files//2020/03/Nota-

stampa-Rapprto-mercato-del-lavoro-2019.pdf.
7. Istat, *Bilancio demografico mensile e popolazione residente per sesso, anno* 2022, Rome, 2022, https://demo.istat.it/app/?i=D7B.
8. Le Bras H., "L'impact Démographique des Migrations d'AprèsGuerre dans quèlques Pays de l'OCDE", in *OCDE, Les Migrations. Aspects demographiques*, Paris, 1991, pp 17-29.
9. Lee R.D. and Carter L.R., "Modeling and Forecasting U.S. Mortality", *Journal of the American Statistical Association*, 419, 87, 1992, pp 659-671.
10. Murphy M., "The impact of migration on long-term European population trends, 1950 to present", *Population and Development Review*, 42, 2, 2016, pp. 225-244.
11. Murphy M., "Use of Counterfactual Population Projections for Assessing the Demographic Determinants of Population Ageing", *European Journal of Population*, 37, 2021, pp. 211-242.
12. Mussino E. and Strozza S., "The fertility of immigrants after arrival: The Italian case", *Demographic Research*, 26, 2012, pp 99-130.
13. Pacelli B., Zengarini N., Broccoli S., Caranci N., Spadea T., Di Girolamo C. and Rossi P.G., "Differences in mortality by immigrant status in Italy. Results of the Italian Network of Longitudinal Metropolitan Studies", *European journal of epidemiology*, 31, 7, 2016, pp. 691-701.
14. Rogers A. and Castro L.J., *Model Migration Schedules*, IIASA Report RR-81-30, Laxenburg, International Institute for Applied Systems Analysis, 1981.
15. Strozza S., Natale M., Todisco E. and Ballacci F. (Eds.), *La rilevazione delle migrazioni internazionali e la predisposizione di un sistema informativo sugli stranieri*, Rapporto di ricerca della Presidenza del Consiglio dei Ministri - Commissione per la garanzia dell'informazione statistica, Rome, 2002.
16. Wilson C., Sobotka T., Williamson L. and Boyle, P., "Migration and intergenerational replacement in Europe", *Population and Development Review*, 39, 1, 2013, pp. 131-157.

