

2006-55: A Stochastic Forecast of the Italian Population

2006-55: Una previsione stocastica della popolazione Italiana

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Riassunto: In Italia, gli studi di popolazione contano su una lunga tradizione di previsioni demografiche, nelle quali viene normalmente seguito un approccio deterministico. Diversamente, in questo lavoro la popolazione italiana al 2055 è prevista seguendo un approccio stocastico, così da calcolarne sia il valore futuro mediano che i corrispondenti intervalli di confidenza. I risultati evidenziano una molto probabile contrazione di popolazione ed un marcato invecchiamento nella sua struttura per età. Inoltre, il ruolo giocato dalla componente migratoria, se mantenuta costante sui livelli recenti, non sembra essere in grado di bilanciare l’attuale squilibrio nella composizione per età della popolazione italiana. Infine, emerge come le giovani coorti rappresentino la fascia di popolazione caratterizzata dal futuro più incerto.

Keywords: Demographic forecast, Italian population, uncertainty, point forecast

1. Introduction

The demographic future of Italy is uncertain. Population forecasts have been a prominent issue in Italian demography for a long time. Most of these works follow a deterministic approach to define the uncertainty of the forecast. Generally, three different scenarios for each demographic variable are assumed. These scenarios are supposed to cover a plausible range of future population trends. The problem deriving from the use of this approach is the impossibility of quantifying the uncertainty of the forecast, because no probability is attached to these scenarios (Lutz et al., 1999). However, for planning reforms in labor markets, health provision and pension system, it is crucial to know the probability at which the given projection will be realized. In the stochastic approach here implemented, we have quantified the probability at which our projection will be reached. Specifically, the uncertainty of the population forecast is quantified by running 3,000 simulations, giving a predictive probability distribution of age-specific mortality and fertility rates, as well as net migration.

2. Method

The starting population is represented by the Italian population as of January 1, 2006. Population forecast are based on the well-known cohort-component method. That method provides only the *point forecast* of the future population. In order to have a stochastic version of the point forecast, providing the probability distribution of the future population size, we have to translate the uncertainty of the demographic variables forecast into the uncertainty of the future population size. To carry out the uncertainty analysis, we apply the so-called scaled model for error by Alho and Spencer (2005) to the errors of the baseline forecasts. The model assumes that the error of our forecast is similar to that of the baseline forecast, which is a fictitious forecast employed to estimate the parameters of the scaled model for error.

3. Assumptions and Results

Concerning mortality the present forecast was performed based on the estimates of past mortality levels assuming a persisting reduction of mortality levels at all ages. We applied the well known Lee-Carter model to the Italian male and female age-specific mortality rates and we modeled the level of mortality with a random walk with drift. Currently, Italy has one of the lowest fertility levels in the world: the average number of children per woman is equal to 1.33 and even lower in some regions. A linear increase of the Italian TFR from 1.33 children per woman to 1.5 after the first 25 years of projection is thus assumed. During the following years the TFR value will be kept constant. The mean age at childbearing is assumed constant during our forecasts. Finally, a constant level of net-migration is assumed. The constant value aims to represent the recent scenario of migration, that we quantified in 153.000 units.

Looking at the results we observed that it is very likely that the population of Italy will decline in the future, and that population aging is inevitable. The median size of the Italian population will decline from 55.3 million in 2006 to 54.1 in 2055 (80% confidence interval 45.0-67.2). In the long run, thus, the current level of net migration provides neither a solution for the population decline, nor a way to achieve a re-equilibrium of the Italian age structure. In order to evaluate solely the contribution of net migration, we combined the higher extreme value of the 80% confidence interval of net migration with the point forecast of mortality and fertility. With these assumptions, a population increase and a slight rejuvenation of the age structure are observed. Nevertheless, the potential contribution of fertility, whose information is embedded in the uncertainty of young cohorts, should be also considered as an important determinant to the slow down the speed of the aging process.

Reference

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