Mortality Measurement at Advanced Ages: A Study of the Social Security Administration Death Master File

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Abstract

Accurate estimates of mortality at advanced ages are essential to improving forecasts of mortality and the population size of the oldest old age group. However, estimation of hazard rates at extremely old ages poses serious challenges to researchers: (1) The observed mortality deceleration may be at least partially an artifact of mixing different birth cohorts with different mortality (heterogeneity effect); (2) Standard assumptions of hazard rate estimates may be invalid when risk of death is extremely high at old ages; (3) Ages of very old people may be exaggerated. One way of obtaining estimates of mortality at extreme ages is to pool together international records of persons surviving to extreme ages with subsequent efforts of strict age validation. This approach helps researchers to resolve the third of the above-mentioned problems but does not resolve the first two problems because of inevitable data heterogeneity when data for people belonging to different birth cohorts and countries are pooled together.

In this paper we propose an alternative approach, which gives an opportunity to resolve the first two problems by compiling data for more homogeneous single-year birth cohorts with hazard rates measured at narrow (monthly) age intervals. Possible ways of resolving the third problem of hazard rate estimation are elaborated. This approach is based on data from the Social Security Administration Death Master File (DMF). Some birth cohorts covered by DMF could be studied by the method of extinct generations. Availability of month of birth and month of death information provides a unique opportunity to obtain hazard rate estimates for every month of age. Study of several single-year extinct birth cohorts shows that mortality trajectory at advanced ages follows the Gompertz law up to the ages 102-105 years without a noticeable deceleration. Earlier reports of mortality deceleration (deviation of mortality from the Gompertz law) at ages below 100 appear to be artifacts of mixing together several birth cohorts with different mortality levels and using cross-sectional instead of cohort data. Age exaggeration and crude assumptions applied to mortality estimates at advanced ages may also contribute to mortality underestimation at very advanced ages.