Threshold Life Tables and Their Applications

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Abstract

The rapid emergence of supercentenarians has highlighted the importance of the tail of the survival distribution and motivated researchers to look for alternative ways to close off the life tables instead of the prevailing practice of assigning a death probability of one at an arbitrarily chosen age. Given the asymptotic results of the extreme value theory, we propose a model, called the threshold life table, which allows practitioners to extrapolate the survival distribution to the extreme ages and to determine the appropriate end point of the life table. The model is further extended to a dynamic version that takes account of the non-diversifiable longevity risk, which originates from the uncertainty in future mortality trends. The theoretical results are finally applied to the stochastic valuation of a life annuity portfolio and to the prediction of the highest attained age for various cohorts.