

Projection of Mortality Rates at Advanced Ages in Canada with a New Lee-Carter Type Model

Louis G. Doray
Kim O. Tang

Presented at the Living to 100 Symposium
Orlando, Fla.
January 5–7, 2011

Copyright 2011 by the Society of Actuaries.

All rights reserved by the Society of Actuaries. Permission is granted to make brief excerpts for a published review. Permission is also granted to make limited numbers of copies of items in this monograph for personal, internal, classroom or other instructional use, on condition that the foregoing copyright notice is used so as to give reasonable notice of the Society's copyright. This consent for free limited copying without prior consent of the Society does not extend to making copies for general distribution, for advertising or promotional purposes, for inclusion in new collective works or for resale.

Abstract

Proper mortality forecast at advanced ages is an important challenge for demographers and actuaries. For this particular population, it has been shown that logistic models for the force of mortality (such as Perks' and Kannisto's models) usually provide very good modeling and forecasts (Thatcher, Kannisto and Vaupel, 1998). However, these models are not frequently used in actuarial practice. In demography, the Lee-Carter model, which offers a simple methodology, has been preferred (Lee and Carter, 1992) for forecasting.

In this paper, we will show that the modeling and forecasting of advanced age population can be improved by combining features of the logistic model for the force of mortality, and the Lee-Carter model. This combination has been inspired by a linear reparametrization of the logistic models taken in Doray (2008). In particular, our model will be applied to the Canadian male population aged 70 to 99 years old and to the Canadian female population aged 80 to 105 years old. The results of our model will be compared to those of two well-known models, the original Lee-Carter model for each sex, and the logistic model of Lee-Carter (Lee, 2000) for each sex. For both sexes, we found that the use of our model presents values closer to the observations and that the forecasts are quite realistic.