

Book Review

Statistical methods with applications to demography and life insurance, Estéate V. Khmaladze, Chapman and Hall/CRC, 2013, 242pp., £49.99. ISBN: 978-1466505735

As the name of the book suggests, the objective of it is to describe statistical techniques relevant for analysing life distributions and life insurance problems.

Though there are several publications on this subject, this book refreshes the idea of how the concepts of pure mathematics and statistics can be applied to demography and life insurance applications.

Spanning across 16 chapters and 215 pages, this book will interest statisticians, mathematicians, actuaries and students interested in the problems of insurance and analysis of individual lifetimes. However, knowledge of mathematics and statistics is required as right from chapter 1, the text is mostly mathematical.

The key feature of the book is that the first 11 chapters describe the key statistical concepts and the next 5 chapters explain the application of these concepts to life insurance.

Initial chapters cover basic concepts like duration of life as a random variable, relevant models for the distribution functions, force of mortality etc. Hence, if you already have a basic understanding of these concepts then you will find these chapters relatively simple and easy to read.

Thereafter, advanced level concepts like Brownian bridge, testing of parametric hypotheses, censored observations and Kaplan Meier estimator are described in detail. These chapters will require more effort to learn.

It also features some interesting concepts such as how to model population dynamics with migrations. In particular you will find Chapter 7 interesting in which an example of duration of rule of Roman empires is discussed. It was insightful to note how exponential distribution was relevant for this duration.

To help readers understand some technical points, concepts like Stieltjes, Wiener and Ito integrals are also described.

I particularly found this book more interesting from Chapter 12 onwards where the applications of the mathematical concepts described in previous chapters are discussed.

Chapter 12 deals with calculation of net premium in case of Whole Life, Term Life, Group Life and Life Insurance with variable sum insured and variable premium. Another area of interest discussed in this chapter is on mixtures of distributions in the case of life insurance. It gives an example of survival functions of the male population of New Zealand in 1876, 1900 and 1932.

Chapter 13 describes the application of mathematics to various forms of endowments and annuities, whereas Chapter 14 takes you into more detail of annuities certain.

Chapter 15 is a very interesting chapter and it describes the right tail behaviour of probability distribution of duration of life which is an emerging theme in life insurance.

The last Chapter 16 again is a nicely written application based chapter on population dynamics. Ample relevant references are provided to help readers to read and understand more.

Another key feature I like and can be of interest particularly to students will be its exercises. There are more than 70 exercises, almost appearing after the discussion of every important concept. These exercises help to understand and appreciate the theory more in detail. However, the solutions to these exercises are not provided in the book.

Hence, overall this book is a well written book, however a few readers may have to put a little more effort in to grasp the mathematical tone of it. Some more real world examples and solutions or hints to the exercises within the book would have been useful.

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