

# Preface

Since Sir David Cox's pioneering work in 1972, the proportional hazards (PH) model has become the most important model in survival analysis and in related applications. The success of the Cox model stimulated further studies in semiparametric and nonparametric theory, counting process models, study designs in epidemiology, and the development of many other regression models which could be more flexible or reasonable in data analysis. Flexible semiparametric regression models are used increasingly often in carcinogenesis studies to relate lifetime distributions to time-dependent explanatory variables. In addition to classical regression models such as the Cox PH model and the accelerated failure time (AFT) model, alternative models like the linear transformation model, the frailty model, and some varying-effect models are also considered by researchers (Martinussen and Scheike 2006; Scheike 2006; Dabrowska 2005, 2006; Bagdonavičius 1978; Zeng and Lin 2007). In this monograph, we discuss some important parametric models as well as several semiparametric regression models. Several classical examples are reconsidered and analyzed here, including the well-known datasets concerning effects of chemotherapy and chemo- plus radiotherapy on the survival of gastric and lung cancer patients (Stablein and Koutrouvelis 1985; Piantadosi 1997; Kalbfleisch and Prentice 2002; Klein and Moeschberger 2003). Following the lines of Scheike (2006), Zeng and Lin (2007), Wu (2007), Huber et al. (2006), we also give examples to illustrate and compare possible applications of the Cox model (1972), the Hsieh model (2001), and Bagdonavičius and Nikulin (2002); Bagdonavičius and Nikulin (2005, 2006) simple cross-effect (SCE) model. All three of them are particularly useful to analyze survival data with one crossing point. This monograph offers a short course or one-semester material for undergraduate or graduate students, for biostatisticians,

and for scientific researchers who demand applications of survival analysis and reliability theory in areas such as gerontology, demography, insurance, clinical trials, medicine, epidemiology, and social sciences.

Bordeaux, France  
Taichung, Taiwan  
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Mikhail Nikulin  
Hong-Dar Isaac Wu

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Nikulin, M.; Wu, H.-D.I.

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