COVARIATE MEASUREMENT ERRORS IN THE ANALYSIS

OF COHORT AND CASE-CONTROL STUDIES

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1. Introduction

This paper discusses the analysis of 'failure' time data, when predictor variables are subject to measurement error. The author's symposium presentation concentrated on a partial likelihood approach to relative risk estimation when covariates are subject to measurement error; material that mostly will appear in Prentice (1982). To avoid undue repetition the presentation here will emphasize full likelihood and marginal likelihood approaches to this problem. The accommodation of covariate measurement errors in the context of case-control sampling will also be briefly considered.

In failure time studies, as well as in many other areas of application, covariate values are subject to measurement errors. Particular applications that motivated this work include a study of the relationship between radiation exposure level and cancer mortality in atomic bomb survivors and a study of cardiovascular disease risk factors in a large cohort study. In the former study, one is interested in cancer mortality dose-response effects corresponding to individual gamma and neutron exposures. These exposure level estimates were, however, imputed from distance (from the presumed hypocenter) and shielding information obtained by interview. Such estimates may differ sub-