Contents

Acknowledgments ix

1. Introduction 1
What Is Event History Analysis? 1
Censoring 3
Hazard Rate, Survivor Function, and Likelihood Function 9
Organization and Characteristics of This Book 11

2. Discrete-Time Logit Models, I: The Analysis of One-Way Transition 15
Methods and Models 15
When Is It Appropriate to Use Discrete-Time Models as an Approximation for Continuous-Time Models? 16
Discrete-Time Models 17
Discrete-Time Logit Model 18
Chi-Square Tests and Comparisons of Nested Models 19
Construction of Input Data 21
Some Misuses of Covariates in Life-Course Research 26
A Misuse of Life-Course Characteristics in Predicting a Life Event 26
A Misuse in the Distinction Between Before and After the Occurrence of a Transition as a Time-Dependent Covariate 27
Application: An Analysis of the Timing of Marriage 28
Data and Covariates 28
Substantive Hypotheses 29
Programming of Models 30
Comparison of Models Using Likelihood-Ratio Tests 33
Interpretation of Parameter Estimates 37
Concluding Remarks 41
Problems 41

3. Discrete-Time Logit Models, II: The Analysis of Two-Way Transitions 46
Methods and Models 46
Modeling Repeatable Events 46
Two Different Uses of the Logit Model for the Analysis of Two-Way Transitions 47
Two-Way Transition Models 49
Modeling Duration Dependence 50
Additional Dimensions of Time 53
Models for Attitudinal or Social Psychological Dependent Variables 53
Application: A Dynamic Analysis of Personal Efficacy 55
Data and Covariates 55
Substantive Hypotheses 57
Programming of Models 58
Description of Three Models 62
Interpretation of Parameters Estimated from Model 2 64
Interpretation of Parameters Estimated from Model 3 67
Concluding Remarks 69
Problems 70

4. Log-Rate Models for Piecewise Constant Rates 71
Methods and Models 71
Log-Rate Models for Piecewise Constant Rates 72
Notes on Input Data 77
Specification of Rate Data in Log-Linear Analysis 78
Application: An Analysis of Interfirm Job Mobility 78
Data and Hypotheses 78
Calculation of Input Data, I: The Numbers of Events, Censored Observations, and Sample Survivors 80
Calculation of Input Data, II: The Amount of Exposure to Risk 81
Notes on Combining Categories 84
Programming of Models 85
Goodness-of-Fit Tests and Comparisons of Models 89
Interpretation of Parameter Estimates 91
Concluding Remarks 96
Problems 97
Appendix 97

5. Continuous-Time Models with Cox's Method, I: Proportional Hazards Models, Nonproportional Hazards Models, and Stratified Models **101**
Methods and Models 101
Proportional Hazards Model 103
Notes on Models Based on the Maximum Likelihood Method 105
Partial Likelihood Estimation 106
Modeling Interaction Effects of Covariates and Time, I: Parametric Models and the Test of Nonproportionality 107
Modeling Interaction Effects of Covariates and Time, II: Stratified Models 108
Model Selection Under the PL Estimation 109
Application: An Analysis of Job Mobility in Japan 111
Data and Hypotheses 111
Programming of Models 113
Comparisons of Models 115
Interpretation of Parameter Estimates 119
Concluding Remarks 124
Problems 126

6. Continuous-Time Models with Cox's Method, II: Use of Time-Dependent Covariates and Related Issues **130**
Methods and Models 130
Selection Bias and Unobserved Heterogeneity 130
Methods for Controlling Unobserved Heterogeneity 131
Reverse Causation 133
A Classification of Covariates and Limitations in the Causal Interpretation of Their Effects 134
Application: An Analysis of Dropping Out of Four-Year College 139
Data and Covariates 139
Substantive Hypotheses 142
Programming of Models with Time-Dependent Covariates 142
Tests and Comparisons of Models 146
Interpretation of Parameters Estimated from Model 4 149
Concluding Remarks 151
Problems 151

7. Final Remarks Before Getting One's Own Research Started **161**
Risk Period 161
Events That Have Logically Preceding Events 161
Events for Which Only the Average Length of the Real Risk Period per Unit of Observed Time Is Available 162
Events with Truncated Duration Dependence 163
Temporal Order 163
Timing of Entry into the Risk Period and Timing of Transitions in Covariate States 164
Duration Dependence and Covariate Duration Effects 165
Identification Problems 166
Interaction Effects Involving Duration Dependence and the Duration of Covariate States 167
Multidimensional Time Effects 167
Competing Events 169
Indirect Effects 172
Concluding Notes 173

References **175**

About the Author **182**