Contents

Acknowledgments xvii					
PART I		INTRODUCTION			
1	Why	Dynamic Analysis? 3			
		Static Analysis for Studying Change 4 Dynamic Analysis for Studying Static Relationships 7 Other Obstacles to Dynamic Analysis 14 Conclusions 15			
2 Varieties of Temporal Analysis: Overview and Critique 17					
	2.1	Observation Plans 18			
		Panel Analysis of Qualitative Outcomes 23			
		Event-History Analysis 28			
		Panel Analysis of Quantitative Outcomes 33			
		Time-Series Analysis 38			
	2.6	Conclusions 39			
PART II QUALITATIVE OUTCOMES					
3	Fund	lamentals of Event-History Analysis 43			
	3.1 3.2 3.3	Event-History Data 45 Terms for Populations of Event Histories 49 Conclusions 77			

Preface xi

viii Contents

4	Models of Change	e in Qualitative Variables	78
		ontinuous-Time Stochastic Mode	els 79
	4.2 Models of Eve		
		f Semi-Markov Models 9	6
	4.4 Particular Mod		
	4.5 Conclusions	114	
5	Estimation Using	Censored Event Histories	116
	5.1 The Censoring		
		elihood Estimation 119	
		n of Right-Censored Event Histo	
		n of Left-Censored Event Histor	120
		s for a Single Constant Rate	135
	5.6 Two Pseudo-M 5.7 A Moment Est		
		timator 140 Results on Effects of Censoring	1.40
	5.9 Measurement l		140
		Results on Measurement Error	147
		ls with Multiple Outcomes	151
	5.12 Conclusions	154	101
6	Models for Hetero	ogeneous Populations	155
	6.1 Parameterizing	Observed Heterogeneity	157
		NIT Effects on Marital Stability	165
		Unobserved Heterogeneity	174
		Unobserved Heterogeneity in Jo	
		on of the Disturbance's Distribu	tion 184
	6.6 Conclusions	186	
		100	
7	Time Dependence	: Parametric Approaches	187
7			187
7	7.1 Sources of Tin7.2 Periodic Shifts	: Parametric Approaches	
7	7.1 Sources of Tin7.2 Periodic Shifts7.3 Linearly Chang	e: Parametric Approaches ne Dependence 189 s in Parameters and Causal Variaging Causal Variables 208	ables 197
7	7.1 Sources of Tin7.2 Periodic Shifts7.3 Linearly Chang	e: Parametric Approaches ne Dependence 189 s in Parameters and Causal Varia	ables 197
7	7.1 Sources of Tin7.2 Periodic Shifts7.3 Linearly Chang	e: Parametric Approaches ne Dependence 189 s in Parameters and Causal Variaging Causal Variables 208	ables 197
7 8	 7.1 Sources of Tin 7.2 Periodic Shifts 7.3 Linearly Chang 7.4 Time as a Prox 7.5 Conclusions 	re: Parametric Approaches ne Dependence 189 in Parameters and Causal Variaging Causal Variables 200 xy for Unobserved Change Proc	ables 197 8 esses 220
•	 7.1 Sources of Tin 7.2 Periodic Shifts 7.3 Linearly Chang 7.4 Time as a Prox 7.5 Conclusions 	e: Parametric Approaches ne Dependence 189 in Parameters and Causal Varia ging Causal Variables 200 xy for Unobserved Change Proc 231 : A Partially Parametric A	ables 197 8 esses 220
•	7.1 Sources of Tin 7.2 Periodic Shifts 7.3 Linearly Chang 7.4 Time as a Prox 7.5 Conclusions Time Dependence	e: Parametric Approaches ne Dependence 189 in Parameters and Causal Varia ging Causal Variables 200 xy for Unobserved Change Proc 231 : A Partially Parametric A ates 233	ables 197 8 esses 220
•	7.1 Sources of Tin 7.2 Periodic Shifts 7.3 Linearly Chang 7.4 Time as a Prov 7.5 Conclusions Time Dependence 8.1 Proportional R 8.2 Partial Likeliho	e: Parametric Approaches ne Dependence 189 in Parameters and Causal Varia ging Causal Variables 200 xy for Unobserved Change Proc 231 : A Partially Parametric A ates 233	ables 197 8 esses 220

Contents ix

	8.11	Handling of Ties 247 Intermittently Measured Explanatory Variables 248 Estimating the Nuisance and Survivor Functions 250 Sources of Variation in the Nuisance Function 252 Multiple Outcomes 254 PL Estimation of Transition Rates Illustrated 256 Repeatable Events 259 Conclusions 263			
9	Syste	ems of Qualitative Variables 265			
	9.1 9.2 9.3 9.4	Modeling Strategies 266 An Example: Marital Status and Employment Statuses Consequences of Ignoring Interdependence 276 Conclusions 294			
10	A C	A Comparison of Approaches 296			
		Event-Count and Event-Sequence Analysis 304 Panel Analysis 305 An Example: Formal Political Structure 307			
PART III QUANTITATIVE OUTCOMES					
11	Line	ear Deterministic Models 331			
	11.1 11.2 11.3 11.4 11.5 11.6	Linear Models for Rates of Change 332 Time Paths of Changes: Integral Equations 341 An Example: Organizational Growth and Decline Linear Systems 352 Integral Equations for Linear Systems 355 Qualitative Stability 359			
	11.7 11.8	Organizational Growth and Decline Reconsidered Conclusions 380 Appendix 381			
12	Line	ear Stochastic Models 384			
	12.1 12.2 12.3 12.4				

x Contents

		Systems of Equations 410			
	12.7	Conclusions 416			
13	Estin	nation of Linear Models 418			
	13.1	Time-Series versus Panel Data 418			
	13.2				
	13.3				
	13.4				
		Pooled Cross-Section and Time-Series Estimators 431			
	13.6				
	13.7				
	13.8				
		Linear Systems 461 Conclusions 464			
	13.10	Conclusions 464			
14	Dete	rministic Nonlinear Models 466			
	14.1	Scalar Models 466			
	14.2	Models of Systems 477			
	14.3	1			
	14.4				
	14.5	· ·			
	14.6				
	14.7	·			
	14.8	Conclusions 509			
15	Stoc	hastic Nonlinear Models 510			
	15.1	Stochastic Integrals: The Nonlinear Case 512			
	15.2				
	15.3	The Ito Transformation Formula 522			
	15.4	Conclusions 526			
16	Cou	pled Qualitative and Quantitative Processes 528			
	16.1	Quality and Quantity 529			
	16.2				
	16.3	Conclusions 538			
Ref	ferenc	es 539			
Author Index 565					
Subject Index 573					