## **Contents**

Acknowledgments

| Preface                         | 9   | x  |
|---------------------------------|---|----|
| Chapter<br><i>The Pro</i><br>1. | ocess, the Model, and Forms of Data The Processes 6                         | 3  |
| 2.<br>3.                        |   |    |
| Chapter                         | 2   |    |
| The Eff                         | fects of Independent Variables: Cross-Sectional Data                        | 19 |
| 1.                              | Cross-Sectional Data 25   |    |
| 2.                              | Linear Decomposition of $q_j$ 's: The Linear Probability Model 26           |    |
| 3.                              | Exponential Linear Decomposition of $q_j$ 's: The Logit Model 28            |    |
| 4.                              | Relationship of Size of Parameters to Expected Effects on<br>Proportions 29 |    |
| 5.                              | Interaction Effects 32  |    |
| 6.                              | Examples 34   |    |
| 7.                              | Logits with Polytymous Responses 43   |    |
| 8.                              | A Reinterpretation of the Process 45  |    |
| 9.                              | What If Statistical Equilibrium Does Not Hold? 47                           |    |
| 10.                             | Statistical Tests for the Model as a Whole 48                               |    |
|                                 | Appendix 1: Alternative Decompositions 51                                   |    |
|                                 | Appendix 2: Use of the LONGIT CROSS Program 53                              |    |
|                                 |   | vi |

X

## Chapter 3 Panel Data Linear Decomposition: Equal and Opposite Effects and Constant Independent Variables 67 Exponential Linear Decomposition 71 Linear Decomposition and Exponential Linear Decomposition: c<sub>k</sub> ≠ -b<sub>k</sub> 75 Nonconstant Independent Variables: Linear Decomposition with Equal and Opposite Effects 78

- Nonconstant Independent Variables: Exponential Linear Decomposition 80
- 6. Nonconstant Independent Variables: Linear Decomposition with Effects Differing in Different Directions 82
- 7. Panel Analysis and Lagged Regression Analysis 84
- 8. Generalizations of a Panel 86
- Left Censoring and Distinguishing Prior Effects from Current Effects 87
- Trend Data in Lieu of Panel Data 90
   Appendix: Use of the LONGIT PANEL Program 91

## Chapter 4

## Interdependent Systems and Structural Equations

108

63

- 1. Purging Endogenous Effects 125
- 2. Introducing Simultaneity into the Equations 127
- 3. The Exact Solution for Two Attributes with  $c_k = -b_k$  for Both Endogenous Attributes 130
- 4. The Exact Solution for an *m*-Attribute Case Where  $c_k = -b_k$  for All Endogenous Attributes 133
- 5. The Exact Solution in the General Case 137
- 6. Interaction Terms in Interdependent Systems 138
- 7. Examples 140
- Statistical Tests for an Interdependent System 147
   Appendix: Use of LONGIT SIMUL Program 148

| Chapter                                | 5  |                 |
|--|--|-----------------|
| <b>Events</b>                          |  | 170             |
| 1.<br>2.<br>3.<br>4.<br>5.<br>6.       | Number of Events 173 Time Since Last Event 175 Sequences of Events 177 Event Histories 185 Maximum Likelihood by Use of Multiple Small Intervals 188 Extensions of Partial Likelihood and Maximum Likelihood Methods 198 Appendix: Use of LONGIT • EVENTP and LONGIT • EVENTM Programs 207 |                 |
| Chapter 6 Maximum Likelihood Estimates |  | 226             |
| 1.<br>2.<br>3.<br>4.<br>5.             | Maximum Likelihood Estimation 226 Cross-Sectional Data on Occupancy of States 233 Panel Data on Occupancy of States 238 Interdependence with Panel Data 255  |                 |
| References                             |  | 29 <sup>-</sup> |
| Index                                  |  | 295             |
|  |  |                 |