

Chapter one

Introduction 1

Proportionality Review and the Supreme Court of New Jersey: A Cautionary Tale 3 Generalized Linear Models 7 Special Topics 13 References 14

Chapter two

Multiple Regression 15

Overview of Simple Regression 17 Extending Simple Regression to Multiple Regression 23 Assumptions of Multiple Regression 27 Measurement Error in the Independent Variables 32 **Regression Diagnostics 33** Dealing with Outliers and Influential Cases 38 Testing the Significance of Individual Regression Coefficients 40 Assessing Overall Model Fit and Comparing Nested Models 41 Comparing Regression Coefficients Within a Single Model: The Standardized Regression Coefficient 46 **Correctly Specifying the Regression Model 48** Model Specification and Building 50 An Example of a Multiple Regression Model 53 Chapter Summary 59

.

0

Key Terms 60 Symbols and Formulas 61 Exercises 63 **Computer Exercises 66** References 72

VÎ CONTENTS

Chapter three

Multiple Regression: Additional Topics 73 Nominal Variables with Three or More Categories in Multiple Regression 76 Nonlinear Relationships 80 Interaction Effects 92 An Example: Race and Punishment Severity 96 An Example: Punishment Severity 105 The Problem of Multicollinearity 109 Chapter Summary 112 Key Terms 113 Symbols and Formulas 113 Exercises 114 Computer Exercises 118 References 126

Chapter four

Logistic Regression 127

Why Is It Inappropriate to Use OLS Regression for a Dichotomous Dependent Variable? 130 Logistic Regression 136

A Substantive Example: Adoption of Compstat in U.S. Police Agencies 146

Interpreting Logistic Regression Coefficients 151

Comparing Logistic Regression Coefficients 158

Evaluating the Logistic Regression Model 166

Statistical Significance in Logistic Regression 169 Chapter Summary 173 Key Terms 175 Symbols and Formulas 176 Exercises 178 Computer Exercises 181 References 185

Chapter five

.

Multiple Regression with Multiple Category Nominal or Ordinal Measures 187

.

Multinomial Logistic Regression 190

- Ordinal Logistic Regression 205
 - Chapter Summary 219

Key Terms 220 Formulas 221 Exercises 222 Computer Exercises 225 References 231

CONTENTS

vii

Chapter six

Count-Based Regression Models 233 The Poisson Distribution 236 Poisson Regression 239 Over-Dispersion in Count Data 249 Quasi-Poisson and Negative Binomial Regression 251 Zero-Inflated Poisson and Negative Binomial Regression 255 Chapter Summary 259 Key Terms 260 Symbols and Formulas 261 Exercises 262 Computer Exercises 263 References 271

Chapter seven

Multilevel Regression Models 273 A Simple Multilevel Model 277 Random Intercept Model with Fixed Slopes 287 Random Coefficient Model 295 Adding Cluster (Level 2) Characteristics 300 Chapter Summary 309 Key Terms 310 Symbols and Formulas 311

> Exercises 312 Computer Exercises 315 References 319

Chapter eight

Statistical Power 321 Statistical Power 323 Components of Statistical Power 326 Estimating Statistical Power and Sample Size for a Statistically Powerful Study 335 Summing Up: Avoiding Studies Designed for Failure 346 Chapter Summary 347 Key Terms 348 Symbols and Formulas 348 Computer Exercises 349

2-2

References 365

Chapter nine

Randomized Experiments 367 The Structure of a Randomized Experiment 368 The Main Advantage of Experiments: Isolating Causal Effects 371

CONTENTS

Internal Validity 375 Selected Design Types and Associated Statistical Methods 377 Block Randomized Designs 389 Using Covariates to Increase Statistical Power in Experimental Studies 400 Chapter Summary 402 Key Terms 403 Symbols and Formulas 404 Exercises 408 Computer Exercises 409 References 415

viii

Propensity Score Matching 417 The Underlying Logic Behind Propensity Score Matching 419 Selection of Model for Predicting Propensity for Treatment 421 Matching Methods 422 Assessing the Quality of the Matches 427 Sensitivity Analysis for Average Treatment Effects 431 Limitations of Propensity Score Matching 433 Chapter Summary 435 Key Terms 436 Symbols and Formulas 437 Exercises 437 Computer Exercises 438

References 448

Chapter eleven

Meta-analysis 451 A Historical Note 454 The Logic of Meta-analysis 455 The Effect Size 456 Meta-analysis of Effect Sizes 467 Forest Plots 474 Moderator Analysis 475 Handling Statistically Dependent Effect Sizes: Robust Standard Errors 480 Publication Selection Bias 482 Chapter Summary 485 Key Terms 486

Symbols and Formulas 486 Exercises 490 Computer Exercises 491 References 496

•

.

CONTENTS

ix

Chapter twelve

Spatial Regression 499 Why Can't We Use OLS Regression with Spatial Data? 501 How Do We Define Spatial Relationships? 502 What Is Spatial Regression? 510 Which Type of Spatial Regression Should I Use? 514 Spatial Regression Example 518 Chapter Summary 523 Key Terms 524

Ø

Symbols and Formulas 525 Exercises 526 Computer Exercises 528 References 535

Glossary 537 Index 543

