

Table of Contents

Preface	VII
Table of Contents	XI
Part I	1
1 What is Econometrics?	3
1.1 Introduction	3
1.2 A Brief History	5
1.3 Critiques of Econometrics	7
1.4 Looking Ahead	8
Notes	10
References	10
2 Basic Statistical Concepts	13
2.1 Introduction	13
2.2 Methods of Estimation	13
2.3 Properties of Estimators	16
2.4 Hypothesis Testing	21
2.5 Confidence Intervals	31
2.6 Descriptive Statistics	32
Notes	36
Problems	37
References	44
Appendix	44
3 Simple Linear Regression	51
3.1 Introduction	51
3.2 Least Squares Estimation and the Classical Assumptions	52
3.3 Statistical Properties of Least Squares	57
3.4 Estimation of σ^2	59
3.5 Maximum Likelihood Estimation	59
3.6 A Measure of Fit	61
3.7 Prediction	62
3.8 Residual Analysis	64
3.9 Numerical Example	66
3.10 Empirical Example	67
Problems	70
References	75
Appendix	75

4	Multiple Regression Analysis	77
4.1	Introduction	77
4.2	Least Squares Estimation	77
4.3	Residual Interpretation of Multiple Regression Estimates	79
4.4	Overspecification and Underspecification of the Regression Equation	80
4.5	R-Squared versus R-Bar-Squared	82
4.6	Testing Linear Restrictions	82
4.7	Dummy Variables	85
	Note	90
	Problems	90
	References	95
	Appendix	97
5	Violations of the Classical Assumptions	99
5.1	Introduction	99
5.2	The Zero Mean Assumption	99
5.3	Stochastic Explanatory Variables	100
5.4	Normality of the Disturbances	102
5.5	Heteroskedasticity	103
5.6	Autocorrelation	115
	Notes	125
	Problems	126
	References	132
6	Distributed Lags and Dynamic Models	137
6.1	Introduction	137
6.2	Infinite Distributed Lag	143
	6.2.1 Adaptive Expectations Model (AEM)	144
	6.2.2 Partial Adjustment Model (PAM)	145
6.3	Estimation and Testing of Dynamic Models with Serial Correlation	145
	6.3.1 A Lagged Dependent Variable Model with AR(1) Disturbances	147
	6.3.2 A Lagged Dependent Variable Model with MA(1) Disturbances	149
6.4	Autoregressive Distributed Lag	149
	Note	150
	Problems	151
	References	153
Part II		155
7	The General Linear Model: The Basics	157
7.1	Introduction	157
7.2	Least Squares Estimation	157

7.3	Partitioned Regression and the Frisch-Waugh-Lovell Theorem	161
7.4	Maximum Likelihood Estimation	162
7.5	Prediction	165
7.6	Confidence Intervals and Test of Hypotheses	166
7.7	Joint Confidence Intervals and Test of Hypotheses	167
7.8	Restricted MLE and Restricted Least Squares	168
7.9	Likelihood Ratio, Wald and Lagrange Multiplier Tests	169
	Notes	174
	Problems	175
	References	180
	Appendix	181
8	Regression Diagnostics and Specification Tests	187
8.1	Influential Observations	187
8.2	Recursive Residuals	197
8.3	Specification Tests	204
8.4	Nonlinear Least Squares and the Gauss-Newton Regression	215
8.5	Testing Linear versus Log-Linear Functional Form	224
	Notes	226
	Problems	226
	References	230
9	Generalized Least Squares	235
9.1	Introduction	235
9.2	Generalized Least Squares	235
9.3	Special Forms of Ω	237
9.4	Maximum Likelihood Estimation	238
9.5	Test of Hypotheses	239
9.6	Prediction	239
9.7	Unknown Ω	240
9.8	The W, LR and LM Statistics Revisited	240
9.9	Spatial Error Correlation	242
	Note	244
	Problems	244
	References	249
10	Seemingly Unrelated Regressions	253
10.1	Introduction	253
10.2	Feasible GLS Estimation	255
10.3	Testing Diagonality of the Variance-Covariance Matrix	258
10.4	Seemingly Unrelated Regressions with Unequal Observations	259
10.5	Empirical Example	260
	Problems	262

References	266
11 Simultaneous Equations Model	269
11.1 Introduction	269
11.1.1 Simultaneous Bias	269
11.1.2 The Identification Problem	272
11.2 Single Equation Estimation: Two-Stage Least Squares	275
11.3 System Estimation: Three-Stage Least Squares	281
11.4 The Identification Problem Revisited: The Rank Condition of Identification	282
11.5 Test for Over-Identification Restrictions	287
11.6 Hausman's Specification Test	289
11.7 Empirical Example	292
Note	293
Problems	293
References	303
12 Pooling Time-Series of Cross-Section Data	307
12.1 Introduction	307
12.2 The Error Components Procedure	307
12.2.1 The Fixed Effects Model	308
12.2.2 The Random Effects Model	311
12.2.3 Maximum Likelihood Estimation	314
12.2.4 Prediction	315
12.2.5 Empirical Example	316
12.2.6 Testing in a Pooled Model	318
12.3 Time-Wise Autocorrelated and Cross-Sectionally Heteroskedastic Procedures	323
12.4 A Comparison of the Two Procedures	324
Problems	325
References	328
13 Limited Dependent Variables	331
13.1 Introduction	331
13.2 The Linear Probability Model	331
13.3 Functional Form: Logit and Probit	332
13.4 Grouped Data	334
13.5 Individual Data: Probit and Logit	335
13.6 The Binary Response Model Regression	337
13.7 Asymptotic Variances for Predictions and Marginal Effects	339
13.8 Goodness of Fit Measures	340
13.9 Empirical Example	340
13.10 Multinomial Choice Models	343
13.10.1 Ordered Response Models	343
13.10.2 Unordered Response Models	344

13.11 The Censored Regression Model	346
13.12 The Truncated Regression Model	349
13.13 Sample Selectivity	350
Notes	352
Problems	352
References	356
Appendix	358
14 Time-Series Analysis	361
14.1 Introduction	361
14.2 Stationarity	361
14.3 The Box and Jenkins Method	363
14.4 Vector Autoregression	366
14.5 Unit Roots	367
14.6 Trend Stationary versus Difference Stationary	371
14.7 Cointegration	373
14.8 Autoregressive Conditional Heteroskedasticity	375
Note	378
Problems	379
References	382
Appendix	387
List of Figures	393
List of Tables	395
Index	397