

Contents

1	Introduction	1
1.1	Overview	1
1.2	Objectives	2
1.2.1	Develop the Student’s Knowledge of the Technical Details of Various Techniques for Analyzing Data	2
1.2.2	Expose Students to Applications and “Hand-On” Use of Various Computer Programs for Carrying Out Statistical Analyses of Data	2
1.3	Types of Scales	3
1.3.1	Definition of Different Types of Scales	4
1.3.2	The Impact of the Type of Scale on Statistical Analysis	4
1.4	Topics Covered	5
1.5	Pedagogy	6
	Bibliography	8
2	Multivariate Normal Distribution	9
2.1	Univariate Normal Distribution	9
2.2	Bivariate Normal Distribution	9
2.3	Generalization to Multivariate Case	11
2.4	Tests About Means	12
2.4.1	Sampling Distribution of Sample Centroids	12
2.4.2	Significance Test: One-Sample Problem	13
2.4.3	Significance Test: Two-Sample Problem	15
2.4.4	Significance Test: <i>K</i> -Sample Problem	17
2.5	Examples Using SAS	19
2.5.1	Test of the Difference Between Two Mean Vectors – One-Sample Problem	19
2.5.2	Test of the Difference Between Several Mean Vectors – <i>K</i> -Sample Problem	21
2.6	Assignment	27
	Bibliography	28

Basic Technical Readings	28
Application Readings	28
3 Reliability Alpha, Principle Component Analysis, and Exploratory Factor Analysis	29
3.1 Notions of Measurement Theory	29
3.1.1 Definition of a Measure	29
3.1.2 Parallel Measurements	30
3.1.3 Reliability	30
3.1.4 Composite Scales	31
3.2 Exploratory Factor Analysis	34
3.2.1 Axis Rotation	34
3.2.2 Variance-Maximizing Rotations (Eigenvalues and Eigenvectors)	35
3.2.3 Principal Component Analysis (PCA)	39
3.2.4 Exploratory Factor Analysis (EFA)	41
3.3 Application Examples Using SAS	47
3.4 Assignment	53
Bibliography	56
Basic Technical Readings	56
Application Readings	57
4 Confirmatory Factor Analysis	59
4.1 Confirmatory Factor Analysis: A Strong Measurement Model	59
4.2 Estimation	61
4.2.1 Model Fit	62
4.2.2 Test of Significance of Model Parameters	65
4.3 Summary Procedure for Scale Construction	65
4.3.1 Exploratory Factor Analysis	65
4.3.2 Confirmatory Factor Analysis	66
4.3.3 Reliability Coefficient α	66
4.3.4 Discriminant Validity	66
4.3.5 Convergent Validity	66
4.4 Second-Order Confirmatory Factor Analysis	67
4.5 Multi-group Confirmatory Factor Analysis	69
4.6 Application Examples Using LISREL	72
4.6.1 Example of Confirmatory Factor Analysis	72
4.6.2 Example of Model to Test Discriminant Validity Between Two Constructs	73
4.6.3 Example of Model to Assess the Convergent Validity of a Construct	78
4.6.4 Example of Second-Order Factor Model	98
4.6.5 Example of Multi-group Factor Analysis	114

4.7	Assignment	120
	Bibliography	121
	Basic Technical Readings	121
	Application Readings	121
5	Multiple Regression with a Single Dependent Variable	123
5.1	Statistical Inference: Least Squares and Maximum Likelihood	123
5.1.1	The Linear Statistical Model	123
5.1.2	Point Estimation	125
5.1.3	Maximum Likelihood Estimation	127
5.1.4	Properties of Estimator	129
5.1.5	R-Squared as a Measure of Fit	133
5.2	Pooling Issues	135
5.2.1	Linear Restrictions	135
5.2.2	Pooling Tests and Dummy Variable Models	138
5.2.3	Strategy for Pooling Tests	141
5.3	Examples of Linear Model Estimation with SAS	141
5.4	Assignment	147
	Bibliography	147
	Basic Technical Readings	147
	Application Readings	147
6	System of Equations	151
6.1	Seemingly Unrelated Regression (SUR)	151
6.1.1	Set of Equations with Contemporaneously Correlated Disturbances	151
6.1.2	Estimation	153
6.1.3	Special Cases	155
6.2	A System of Simultaneous Equations	155
6.2.1	The Problem	155
6.2.2	Two-Stage Least Squares: 2SLS	159
6.2.3	Three-Stage Least Squares: 3SLS	160
6.3	Simultaneity and Identification	160
6.3.1	The Problem	160
6.3.2	Order and Rank Conditions	161
6.4	Summary	163
6.4.1	Structure of Γ Matrix	163
6.4.2	Structure of Σ Matrix	163
6.4.3	Test of Covariance Matrix	164
6.4.4	3SLS Versus 2SLS	165
6.5	Examples Using SAS	165
6.5.1	Seemingly Unrelated Regression Example	165
6.5.2	Two-Stage Least Squares Example	176
6.5.3	Three-Stage Least Squares Example	176
6.6	Assignment	180

Bibliography	184
Basic Technical Readings	184
Application Readings	184
7 Canonical Correlation Analysis	187
7.1 The Method	187
7.1.1 Canonical Loadings	190
7.1.2 Canonical Redundancy Analysis	190
7.2 Testing the Significance of the Canonical Correlations	190
7.3 Multiple Regression as a Special Case of Canonical Correlation Analysis	192
7.4 Examples Using SAS	193
7.5 Assignment	198
Bibliography	198
Application Readings	198
8 Categorical Dependent Variables	199
8.1 Discriminant Analysis	199
8.1.1 The Discriminant Criterion	199
8.1.2 Discriminant Function	202
8.1.3 Classification and Fit	204
8.2 Quantal Choice Models	208
8.2.1 The Difficulties of the Standard Regression Model with Categorical Dependent Variables	208
8.2.2 Transformational Logit	209
8.2.3 Conditional Logit Model	212
8.2.4 Fit Measures	215
8.3 Examples	217
8.3.1 Example of Discriminant Analysis Using SAS	217
8.3.2 Example of Multinomial Logit – Case 1 Analysis Using LIMDEP	223
8.3.3 Example of Multinomial Logit – Case 2 Analysis Using LIMDEP	225
8.4 Assignment	227
Bibliography	227
Basic Technical Readings	227
Application Readings	228
9 Rank-Ordered Data	231
9.1 Conjoint Analysis – MONANOVA	231
9.1.1 Effect Coding Versus Dummy Variable Coding	231
9.1.2 Design Programs	238
9.1.3 Estimation of Part-Worth Coefficients	238
9.2 Ordered Probit	239
9.3 Examples	243
9.3.1 Example of MONANOVA Using PC-MDS	243

9.3.2	Example of Conjoint Analysis Using SAS	244
9.3.3	Example of Ordered Probit Analysis Using LIMDEP	246
9.4	Assignment	248
	Bibliography	250
	Basic Technical Readings	250
	Application Readings	250
10	Error in Variables – Analysis of Covariance Structure	253
10.1	The Impact of Imperfect Measures	253
10.1.1	Effect of Errors-in-Variables	253
10.1.2	Reversed Regression	255
10.1.3	Case with Multiple Independent Variables	256
10.2	Analysis of Covariance Structures	257
10.2.1	Description of Model	257
10.2.2	Estimation	259
10.2.3	Model Fit	262
10.2.4	Test of Significance of Model Parameters	263
10.2.5	Simultaneous Estimation of Measurement Model Parameters with Structural Relationship Parameters Versus Sequential Estimation	263
10.2.6	Identification	263
10.2.7	Special Cases of Analysis of Covariance Structure	264
10.3	Analysis of Covariance Structure with Means	266
10.4	Examples of Structural Model with Measurement Models Using LISREL	267
10.5	Assignment	268
	Bibliography	291
	Basic Technical Readings	291
	Application Readings	291
11	Cluster Analysis	295
11.1	The Clustering Methods	295
11.1.1	Similarity Measures	296
11.1.2	The Centroid Method	296
11.1.3	Ward's Method	300
11.1.4	Nonhierarchical Clustering: <i>K</i> -Means Method (FASTCLUS)	305
11.2	Examples Using SAS	306
11.2.1	Example of Clustering with the Centroid Method	306
11.2.2	Example of Clustering with Ward's Method	310
11.2.3	Example of FASTCLUS	310
11.3	Evaluation and Interpretation of Clustering Results	312
11.3.1	Determining the Number of Clusters	312
11.3.2	Size, Density, and Separation of Clusters	320
11.3.3	Tests of Significance on Other Variables than Those Used to Create Clusters	320

11.3.4	Stability of Results	320
11.4	Assignment	321
	Bibliography	321
	Basic Technical Readings	321
	Application Readings	321
12	Analysis of Similarity and Preference Data	323
12.1	Proximity Matrices	323
12.1.1	Metric Versus Nonmetric Data	323
12.1.2	Unconditional Versus Conditional Data	324
12.1.3	Derived Measures of Proximity	324
12.1.4	Alternative Proximity Matrices	324
12.2	Problem Definition	325
12.2.1	Objective Function	326
12.2.2	Stress as an Index of Fit	326
12.2.3	Metric	327
12.2.4	Minimum Number of Stimuli	328
12.2.5	Dimensionality	328
12.2.6	Interpretation of MDS Solution	328
12.2.7	The KYST Algorithm	329
12.3	Individual Differences in Similarity Judgments	330
12.4	Analysis of Preference Data	331
12.4.1	Vector Model of Preferences	331
12.4.2	Ideal Point Model of Preferences	331
12.5	Examples Using PC-MDS	332
12.5.1	Example of KYST	332
12.5.2	Example of INDSCAL	335
12.5.3	Example of PROFIT (Property Fitting) Analysis	341
12.5.4	Example of MDPREF	350
12.5.5	Example of PREFMAP	356
12.6	Assignment	358
	Bibliography	368
	Basic Technical Readings	368
	Application Readings	368
13	Appendices	369
	Appendix A: Rules in Matrix Algebra	369
	Vector and Matrix Differentiation	369
	Kronecker Products	369
	Determinants	369
	Trace	369
	Appendix B: Statistical Tables	370
	Cumulative Normal Distribution	370
	Chi-Squared Distribution	370
	F Distribution	371
	Appendix C: Description of Data Sets	372

The MARKSTRAT® Environment	373
Marketing Mix Decisions	375
Survey	376
Indup	381
Panel	381
Scan	382
Bibliography	384
About the Author	385
Index	387



<http://www.springer.com/978-1-4419-1269-5>

Statistical Analysis of Management Data

GATIGNON, H.

2010, XVII, 388 p., Hardcover

ISBN: 978-1-4419-1269-5