

Table of Contents

Preface	xiii
Acknowledgements	xvi
Chapter 1 Statistics for Decision Making and Competitive Advantage	1
1.1 Statistical Competences Translate into Competitive Advantages	1
1.2 The Path Toward Statistical Competence and Competitive Advantage	2
1.3 Use Excel for Competitive Advantage	2
1.4 Statistical Competence Is Powerful and Yours	3
Chapter 2 Describing Your Data.....	5
2.1 Describe Data with Summary Statistics and Histograms	5
2.2 Round Descriptive Statistics.....	9
2.3 Share the Story That Your Graphics Illustrate	9
2.4 Data Is Measured with Quantitative or Categorical Scales	10
2.5 Continuous Data Are Sometimes Normal.....	11
2.6 The Empirical Rule Simplifies Description.....	12
2.7 Outliers Can Distort the Picture.....	13
2.8 Central Tendency, Dispersion and Skewness Describe Data	14
2.9 Describe Categorical Variables Graphically	14
2.10 Descriptive Statistics Depend On the Data and Rely on Your Packaging.....	15
Excel 2.1 Produce Descriptive Statistics	17
Excel 2.2 Sort to Produce Descriptives Without Outliers	25
Excel 2.3 Plot a Cumulative Distribution	26
Excel 2.4 Use a PivotTable to Sort by Industry.....	29
Excel 2.5 Produce a Column Chart of a Nominal Variable	31
Excel Shortcuts Used in Chapter 2	34
Significant Digits Guidelines.....	37
Lab 2 Description	39
Assignment 2.1 Procter & Gamble’s Global Advertising	41
Assignment 2.2 Best Practices Survey	42
Assignment 2.3 Shortcut Challenge	43
Case 2.1 VW Backgrounds.....	43
Case 2.2 Global Smelter Costs at Alcoa.....	43

Chapter 3	Hypothesis Tests, Confidence Intervals to Infer Population Characteristics and Differences	47
3.1	Sample Means Are Random Variables	47
3.2	Infer Whether a Population Mean Exceeds a Target	51
3.3	Critical t Provides a Benchmark	53
3.4	Confidence Intervals Estimate the Population Mean.....	54
3.5	Calculate Approximate Confidence Intervals with Mental Math.....	56
3.6	Margin of Error Is Inversely Proportional to Sample Size.....	57
3.7	Determine Whether Two Segments Differ with Student t.....	58
3.8	Estimate the Extent of Difference Between Two Segments.....	62
3.9	Estimate a Population Proportion from a Sample Proportion	63
3.10	Conditions for Assuming Approximate Normality	65
3.11	Conservative Confidence Intervals for a proportion	65
3.12	Assess the Difference Between Alternate Scenarios or Pairs	67
3.13	Inference from Sample to Population.....	71
Excel 3.1	Test the Level of a Population Mean with a One Sample t test.	73
Excel 3.2	Make a Confidence Interval for a Population Mean.....	74
Excel 3.3	Illustrate Confidence Intervals with Column Charts	75
Excel 3.4	Test the Difference Between Two Segment Means with a Two Sample t test.....	80
Excel 3.5	Construct a Confidence Interval for the Difference Between Two Segments	81
Excel 3.6	Illustrate the Difference Between Two Segment Means with a Column Chart.....	84
Excel 3.7	Construct a Pie Chart of Shares.....	85
Excel 3.8	Test the Difference in Between Alternate Scenarios or Pairs with a Paired t test.....	87
Excel 3.9	Construct a Confidence Interval for the Difference Between Alternate Scenarios or Pairs	88
	Lab 3.1 Inference	89
	Cingular's Position in the Cell Phone Service Market	89
	Value of a Nationals Uniform	89
	Confidence in Chinese Imports	90
	Lab 3.2 Inference: Dell Smartphone Plans	91
	Assignment 3.1 The Marriott Difference.....	93
	Assignment 3.2 Immigration in the U.S.	93
	Assignment 3.3 McLattes	94
	Assignment 3.4 A Barbie Duff in Stuff	94
	Assignment 3.5 Alcoa Smelters.....	94
	Case 3.1 Yankees v Marlins: The Value of a Yankee Uniform.....	97
	Case 3.2 Gender Pay	97
	Case 3.3 Polaski Vodka: Can a Polish Vodka Stand Up to the Russians?	98

Chapter 4	Simulation to Infer Future Performance Levels Given Assumptions	101
4.1	Specify Assumptions Concerning Future Performance Drivers.....	101
4.2	Compare Best and Worst Case Performance Outcomes.....	105
4.3	Spread and Shape Assumptions Influence Possible Outcomes	106
4.4	Monte Carlo Simulation of the Distribution of Performance Outcomes	107
4.5	Monte Carlo Simulation Reveals Possible Outcomes Given Assumptions	112
Excel 4.1	Set Up a Spreadsheet to Link Simulated Performance Components	113
Excel 4.2	View a Simulated Sample with a Histogram.....	115
	Lab 4 Inference: Dell Android Smartphone Plans.....	131
	Case 4.1 American Girl in Starbucks.....	133
	Case 4.2 Can Whole Foods Hold On?	133
	Case 4.3 Chipotle's Ambitions to Triple Share of Top 100 Chain Sales in the Recession Rebound.....	135
Chapter 5	Simple Regression for Long Range Forecasts.....	137
5.1	The Simple Linear Regression Equation Describes the Line Relating an Independent Variable to Performance	138
5.2	Hide the Two Most Recent Datapoints to Validate a Time Series Model.....	138
5.3	Test and Infer the Slope	141
5.4	The Regression Standard Error Reflects Model Precision	144
5.5	Prediction Intervals Estimate Average Population Response.....	145
5.6	<i>Rsquare</i> Summarizes Strength of the Hypothesized Linear Relationship and <i>F</i> Tests Its Significance.....	146
5.7	Assess Residuals to Learn Whether Assumptions Are Met	149
5.8	Recalibrate to Update a Valid Model	151
5.9	Present Regression Results in Concise Format	153
5.10	Assumptions We Make When We Use Linear Regression	154
5.11	Correlation Reflects Linear Association.....	154
5.12	Correlation Coefficients Are Key Components of Regression Slopes	157
5.13	Correlation Complements Regression	158
5.14	Linear Regression Is Doubly Useful	158
Excel 5.1	Build a Simple Linear Regression Model.....	159
Excel 5.2	Assess Residuals	160
Excel 5.3	Construct Prediction Intervals to Validate	162
Excel 5.4	Recalibrate and Present Fit and Forecast in a Scatterplot.....	165
Excel 5.5	Find Correlations Between Variable Pairs	170
	Lab 5 Forecast Concha y Toro Exports to Latin America	171
	Assignment 5.1 Forecast Concha y Toro Exports to Europe and Asia.....	173
Chapter 6	Consolidating Multiple Naïve Forecasts with Monte Carlo	175
6.1	Use Monte Carlo to Integrate Multiple Uncertain Naïve Forecasts	176
6.2	Monte Carlo Offers Likely Possibilities from Consolidated Multiple Naïve Forecasts	177

Excel 6.1	Use Monte Carlo to Produce a 95% Prediction Interval of Consolidated Possibilities from Multiple Naïve Forecasts	178
	Lab 6 Forecast Concha y Toro Consolidated Exports to the New World.....	181
	Assignment 6 Forecast Concha y Toro Consolidated Exports Worldwide	183
	Case 6 Can Arcos Dorados Hold On?	185
Chapter 7	Presenting Statistical Analysis Results to Management	187
7.1	Use PowerPoints to Present Statistical Results for Competitive Advantage.....	187
7.2	Write Memos that Encourage Your Audience to Read and Use Results	194
	MEMO Re: Worldwide exports forecast to grow modestly through 2016.....	196
	Case 7 Segmentation of the Market for Preemie Diapers.....	199
	The Market for Preemie Diapers	200
	Preemie Parent Segments.....	200
	The Concept Test.....	201
	Data Recoding	202
Chapter 8	Finance Application: Portfolio Analysis with a Market Index as a Leading Indicator in Simple Linear Regression	207
8.1	Rates of Return Reflect Expected Growth of Stock Prices	207
8.2	Investors Trade Off Risk and Return.....	209
8.3	Beta Measures Risk	209
8.4	A Portfolio Expected Return, Risk and Beta Are Weighted Averages of Individual Stocks.....	213
8.5	Better Portfolios Define the Efficient Frontier.....	214
	MEMO Re: Recommended Portfolio is Diversified.....	216
8.6	Portfolio Risk Depends on Correlations with the Market and Stock Variability	217
Excel 8.1	Estimate Portfolio Expected Rate of Return and Risk.....	218
Excel 8.2	Plot Return by Risk to Identify Dominant Portfolios and the Efficient Frontier.....	220
	Lab 8 Portfolio Risk and Return	225
	Assignment 8 Portfolio Risk and Return	227
Chapter 9	Association Between Two Categorical Variables: Contingency Analysis with Chi Square.....	229
9.1	When Conditional Probabilities Differ from Joint Probabilities, There Is Evidence of Association	229
9.2	Chi Square Tests Association Between Two Categorical Variables	231
9.3	Chi Square Is Unreliable If Cell Counts Are Sparse	233
9.4	Simpson's Paradox Can Mislead.....	235
	MEMO Re.: Country of Assembly Does Not Affect Older Buyers' Choices	240
9.5	Contingency Analysis Is Demanding	241
9.6	Contingency Analysis Is Quick, Easy, and Readily Understood.....	241

Excel 9.1	Construct Crosstabulations and Assess Association Between Categorical Variables with PivotTables and PivotCharts	242
Excel 9.2	Use Chi Square to Test Association	244
Excel 9.3	Conduct Contingency Analysis with Summary Data	246
	Lab 9 Skype Appeal.....	251
	Assignment 9.1 Wine Preferences by Global Region.....	253
	Assignment 9.2 Fit Matters.....	253
	Assignment 9.3 Netbooks in Color.....	253
	Case 9.1 Hybrids for American Car.....	255
	Case 9.2 Tony's GREAT Advertising	255
	Case 9.3 Hybrid Motivations	256
Chapter 10	Building Multiple Regression Models.....	259
10.1	Explanatory Multiple Regression Models Identify Drivers and Forecast	259
10.2	Use Your Logic to Choose Model Components.....	260
10.3	Multicollinear Variables Are Likely When Few Variable Combinations Are Popular in a Sample	263
10.4	F Tests the Joint Significance of the Set of Independent Variables	263
10.5	Insignificant Parameter Estimates Signal Multicollinearity	265
10.6	Combine or Eliminate Collinear Predictors.....	267
10.7	Decide Whether Insignificant Drivers Matter	272
10.8	Sensitivity Analysis Quantifies the Marginal Impact of Drivers.....	274
	MEMO Re: Light, responsive, fuel efficient cars with smaller engines are cleanest.....	277
10.9	Model Building Begins With Logic and Considers Multicollinearity.....	278
Excel 10.1	Build and Fit a Multiple Linear Regression Model	279
Excel 10.2	Use Sensitivity Analysis to Compare the Marginal Impacts of Drivers	284
	Lab 10 Model Building with Multiple Regression: Pricing Dell's Navigreat.	293
	Assignment 10.1 Sakura Motor's Quest for Fuel Efficiency.....	297
	Case 10.1 Fast Food Nations	299
	Case 10.2 Chasing Chipotle's Success	299
	Case 10.3 Costco's Warehouse Location Scheme.....	301
Chapter 11	Indicator Variables.....	303
11.1	Indicators Modify the Intercept to Account for Segment Differences	303
11.2	Indicators Estimate the Value of Product Attributes	306
11.3	Indicators Estimate Segment Mean Differences.....	310
11.4	Analysis of Variance Offers an Alternative to Regression with Indicators.....	314
11.5	ANOVA and Regression with Indicators Are Complementary Substitutes	318
11.6	ANOVA and Regression in Excel.....	319
Excel 11.1	Use Indicators to Find Part Worths and Attribute Importances.....	320
Excel 11.2	Use ANOVA to Test Equivalence of Mean Interest Ratings	325
	Lab 11.1 Revere Bank Profits.....	329
	Lab 11.2 Power PowerPoints.....	331

Lab 11.3 ANOVA and Regression with Indicators: Powerful PowerPoints	333
Assignment 11 Forecasting Chipotle Revenue in the Long Range	335
Case 11 Store24 (A): Managing Employee Retention and Store24 (B): Service Quality and Employee Skills	337
Chapter 12 Model Building and Forecasting with Multicollinear Time Series	339
12.1 Time Series Models Include Decision Variables, External Forces, and Leading Indicators	342
12.2 Indicators of Economic Prosperity Lead Business Performance	343
12.3 Hide the Two Most Recent Datapoints to Validate a Time Series Model.....	343
12.4 Compare Scatterplots to Choose Driver Lags: Visual Inspection	344
12.5 Assess Residuals to Identify Unaccounted for Trend or Cycles.....	347
12.6 Forecast the Recent, Hidden Points to Assess Predictive Validity.....	352
12.7 Add the Most Recent Datapoints to Recalibrate.....	352
12.8 Compare Part Worths to Assess Driver Importances	354
MEMO Re: Slow, Stable Growth Forecast in Next Four Quarters	355
12.9 Leading Indicator Components Are Powerful Drivers and Often Multicollinear	356
Excel 12.1 Build and Fit a Multiple Regression Model with Multicollinear Time Series.....	358
Excel 12.2 Create Potential Driver Lags	360
Excel 12.3 Select the Most Promising Driver	362
Excel 12.4 Plot Residuals to Identify Unaccounted for Trend, Cycles, or Seasonality and Assess Autocorrelation	364
Excel 12.5 Test the Model's Forecasting Validity.....	371
Excel 12.6 Recalibrate to Forecast.....	373
Excel 12.7 Illustrate the Fit and Forecast.....	374
Excel 12.8 Assess the Impact of Drivers.	375
Lab 12.1 What Is Driving WFM Revenues... and What Revenues Can WFM Expect Next Year?	379
Lab 12.2 What Is Driving WFM Revenues... and What Revenues Can WFM Expect Next Year?	383
Case 12 McDonalds Revenue Drivers and Future Prospects.....	385
Case 12.1 Chipotle Quarterly Revenues Model and Forecast	390
Chapter 13 Nonlinear Multiple Regression Models	395
13.1 Consider a Nonlinear Model When Response Is Not Constant.....	395
13.2 Skewness Signals Nonlinear Response	395
13.3 Rescaling y Builds in Interactions	399
13.4 The Margin of Error Is Not Constant with a Nonlinear Model	404
13.5 Sensitivity Analysis Enables Scenario Comparisons	404
13.6 Nonlinear Models Inform Monte Carlo Simulation	410
13.7 Gains from Nonlinear Rescaling Are Significant.....	411
13.8 Nonlinear Models Offer the Promise of Better Fit and Better Behavior	412
Excel 13.1 Rescale to Build and Fit Nonlinear Regression Models with Linear Regression	413
Excel 13.2 Compare Scenarios with Sensitivity Analysis.....	427

Excel 13.3	Use Nonlinear Regression Estimates with Monte Carlo Simulation.....	431
Lab 13.1	Nonlinear Forecasting LAN Airlines Passenger Revenues: Building the Model	437
Lab 13.2	Nonlinear Forecasting LAN Airlines Passenger Revenues: Describe the Model	439
Lab 13.3	Forecasting with Uncertain Drivers: LAN Passenger Revenues	441
Assignment 13.1	Billionaires in 2020.....	443
Assignment 13.2	Primary Aluminum Production in 2020.....	445
Chapter 14	Nonlinear Explanatory Multiple Regression Models	447
14.1	Sensitivity Analysis Reveals the Relative Strength of Drivers	451
14.2	Sensitivity Analysis with Nonlinear Models Reveals Interactions.....	453
Excel 14.1	Build a Nonlinear Model with Cross Sectional Data.....	454
Excel 14.2	Sensitivity Analysis of Scenarios and Driver Influence	458
Lab 14	Mattel's Acquisition of Radica.....	463
Assignment 14	Identifying Promising Global Markets	465
Case 14.1	Promising Global Markets for EVs.....	467
Case 14.2	Chasing Whole Foods' Success	469
Case 14.3	Promising Global Markets for Water Purification	471
Index	473

Business Statistics for Competitive Advantage with
Excel 2016

Basics, Model Building, Simulation and Cases

Fraser, C.

2016, XIV, 475 p. 375 illus., 370 illus. in color.,

Hardcover

ISBN: 978-3-319-32184-4