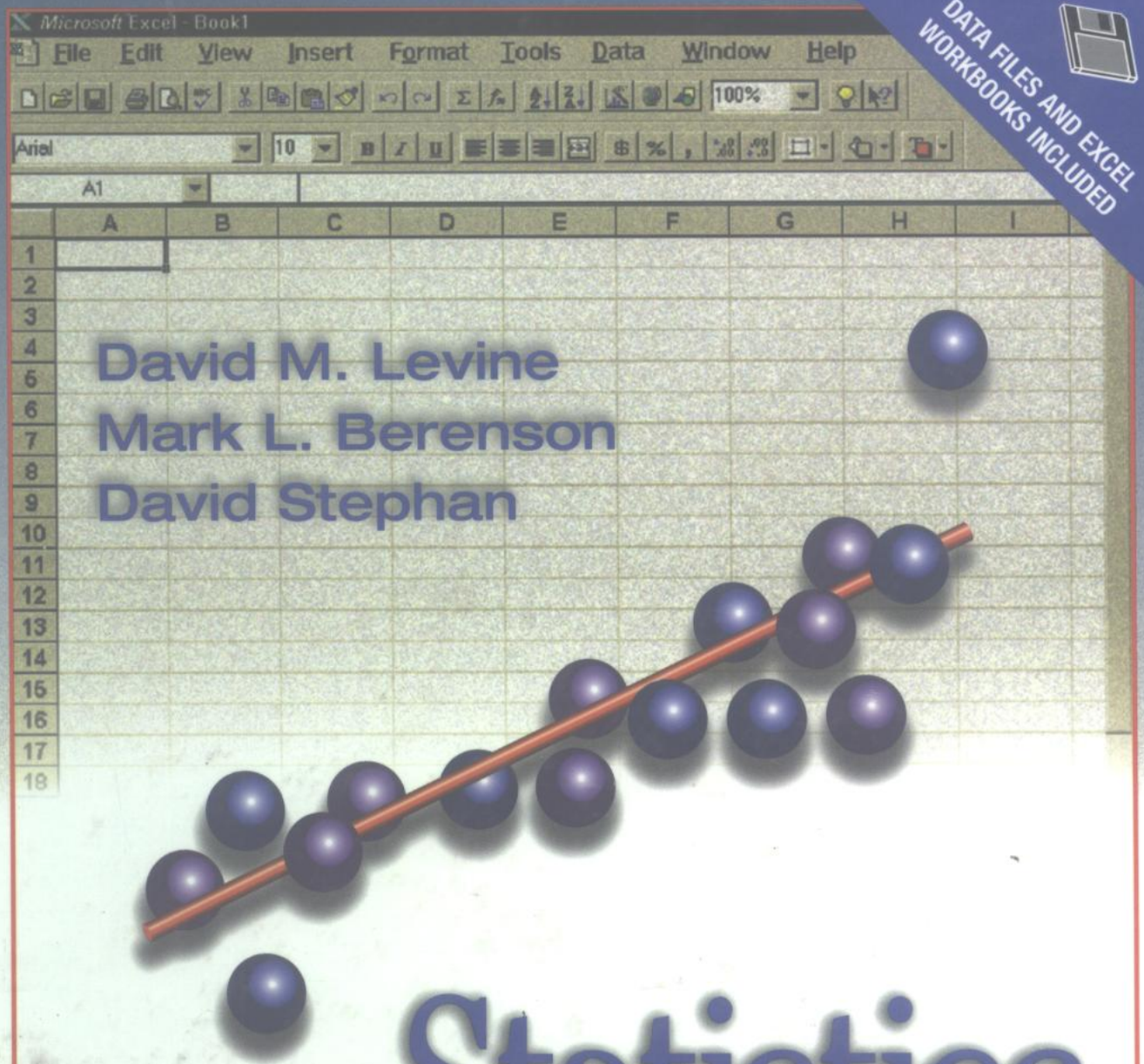

DATA FILES AND EXCEL WORKBOOKS INCLUDED

David M. Levine
Mark L. Berenson
David Stephan

Statistics for Managers

USING MICROSOFT® EXCEL

Statistics for Managers Using Microsoft® Excel

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Preface

When planning this textbook, the authors focused on how desktop productivity tools, such as spreadsheet applications, have altered managers' decision-making processes. Whereas they once had to turn to a Management Information Systems Department or an Information Center to obtain customized summaries of corporate data, today an increasing number of managers use spreadsheet applications as the means to retrieve and analyze directly the data they need. In this context, employers now are beginning to desire, if not demand, that their college-educated, entry-level employees have more than just a cursory awareness of such tools as spreadsheet applications.

These changes, along with the realization that current spreadsheet applications can perform the type of analyses once done only by specialized statistical packages, have led us to develop *Statistics for Managers Using Microsoft Excel*. Our text contains the following features that distinguish it from the many other statistics texts available for business students (several of which have been written by two of us):

- Use of Microsoft Excel as a tool for statistical analysis throughout the text
- A streamlined version of topical coverage with sufficient breadth of coverage
- An enhanced managerial focus for statistical methods.

Main Feature: Use of Microsoft Excel for Statistical Analysis Throughout the Text

Statistics for Managers Using Microsoft Excel integrates the spreadsheet application Microsoft Excel throughout the entire text. This approach is fundamentally different from that of the many texts published and revised in the past twenty years. Since the advent of the computer revolution, statistics texts have struggled with the appropriate way to incorporate the use of statistical software packages. Most typically such packages as SAS, SPSS, and Minitab have been illustrated. A dilemma for faculty teaching this course has been how students could obtain access to (often through site licenses and student versions) the statistical software selected and how these packages could be used in the course. Often, students are not familiar with these packages prior to the statistics course, and only a limited number may use them in subsequent courses. Thus, students may view them as but one more hurdle to overcome in getting through the statistics course.

However, in the last several years, with the increasing functionality and power of spreadsheet applications, virtually all the kinds of statistical analysis taught in an introductory course are directly supported by the Microsoft Excel program (Version 5.0 or later), available for a variety of different systems including Windows 3.1, Windows 95, and Macintosh. In addition to its possible use in a statistics course, students typically learn the fundamentals of a spreadsheet application—either Microsoft Excel itself or a similar program—in an information systems course, and then use Excel in courses in accounting, finance, and other functional areas of business. Even if they are not familiar with Excel, they undoubtedly have heard of this software; and its use in the statistics course will give added relevancy to the course.

Because entering students' spreadsheet applications skills do vary, and because school and home computer facilities are sometimes limited, the demonstration of how Microsoft Excel can be incorporated into a statistics course must also vary. This text has been written for a number of situations, including the following:

1. **Statistical concepts with hands-on Excel development.** Instructors who wish to teach statistical concepts and the development of Excel-based solutions will find that the text includes detailed instructions for the design and implementation of Excel workbooks for each statistical topic discussed. These instructions are presented using a consistent developmental methodology that assists the student in developing their own solutions to statistical problems. (The methodology is summarized in Chapter 1S and is reflected in all of the Excel workbooks that are included on the diskette that accompanies this text.)
2. **Statistical concepts with Excel usage.** Instructors who wish to include Microsoft Excel in their courses but do not have the time or inclination to discuss specific steps of workbook development, can simply use the implemented examples on the diskette that accompanies this text, along with the portions of the Excel sections that analyze workbook results. The design of many of the diskette workbooks allows them to function as generalized templates into which different sets of data values can be entered and analyzed. (Each Excel section includes at least one workbook, and finished versions of all workbooks whose implementation is discussed in the text are included on the diskette that accompanies this text.)
3. **Statistical concepts with Excel exposure.** Where the instructor wishes to make students aware of the statistical applications of spreadsheets, but using Microsoft Excel directly is impractical, the results obtained from Excel for each statistical topic can be illustrated. (In these cases, the contents of the diskette can serve as the basis for optional assignments or student enrichment.)

Special Excel-related Features of the Text

1. **Excel orientation.** Because of the diverse computer backgrounds of incoming students, this text includes a comprehensive tutorial chapter, Introduction to Using Microsoft Excel (Chapter 1 Supplement), that assumes no previous experience using Excel or the windowing environments in which the program runs.
2. **Use of the workbook structure.** All the examples discussed in this text make full use of the Excel workbook feature to organize logically the data, calculations, and the results of a statistical analysis into different worksheets. In addition, all the workbooks included on the diskette that accompanies the text contain overview sheets that summarize the contents of the workbook and the relevant statistical concepts. The overview sheet that relates to the example discussed in Chapter 11 is illustrated in Figure P.1.Excel.
3. **Generalized instructions.** Instructions in the text for using Microsoft Excel will work equally well with the current versions of the program for the Macintosh, Windows 3.1, and Windows 95. (Details that are specific to particular windowing environments, such as the use of accelerator keys, have been avoided.)
4. **Alternative Excel approaches are contrasted.** Where appropriate, the text explores the differences between the use of Data Analysis tools and formula-based worksheets for statistical analysis.
5. **Coverage of an extensive set of Excel features.** The text includes a comprehensive discussion of the specialized functions, the PivotTable and Chart Wizards, the Text Import Wizard for importing text files into Microsoft Excel, the Data Analysis tools for statistical analysis, and the Scenario Manager as an aid in "What if" analyses.

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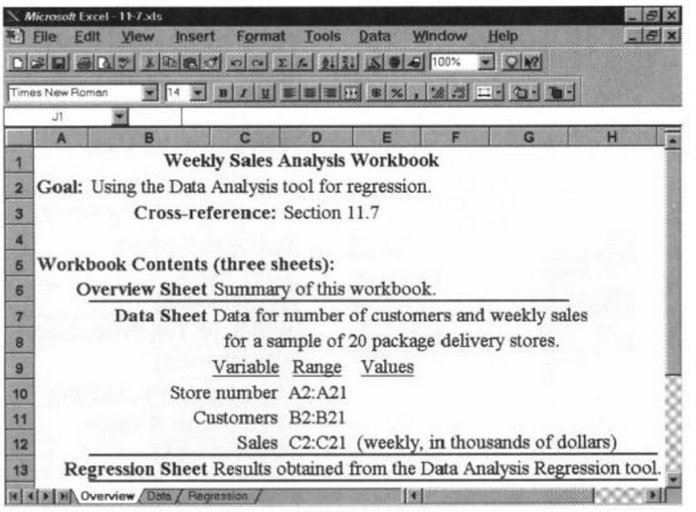

FIGURE P.1.EXCEL Overview sheet.

Excel Integration

In each chapter subsequent to Chapter 1, after a statistical topic has been covered, the use of Microsoft Excel as applied to the statistical topic is discussed in step-by-step detail. Each presentation of Excel material has the goal of ensuring that students will be able to use the standard features of Microsoft Excel to do what was just covered in the text. Thus, by the time the text is completed, students will have gained the necessary foundation in Excel to create their own workbooks to perform statistical and other types of analyses. An example of this detail can be seen in the discussion of the use of Excel to obtain descriptive statistics. In Sections 3.4.6 and 3.5.5 (pages 128–132 and 142–143), Excel functions are discussed; while in Section 3.7, the use of the Data Analysis tool is explained (pages 146–148). The output obtained from Excel is illustrated in Figure 3.7.Excel, which is duplicated below in Figure P.2.Excel.

Numerous screen shots such as this are utilized throughout the text, and any statistical output obtained is explained in detail.

E1

	A	B
1	Sample Statistics for Pennsylv	
2		
3	Tuition Variable	
4	Mean	8.3
5	Median	8.3
6	Mode	#N/A
7	Minimum	4.9
8	Maximum	11.7
9	Midrange	8.3
10	First Quartile rank	1.75
11	First Quartile	6.3
12	Third Quartile rank	5.25
13	Third Quartile	10.3
14	Midhinge	8.3

FIGURE P.2.EXCEL Measures of central tendency obtained from Excel for out-of-state tuition rates for the six-school sample from Pennsylvania.

D1

	A	B
1	Calculating Normal Probabilities	
2		
3	Arithmetic Mean	75
4	Standard Deviation	6
5	Left Tail Probability	
6	First X Value	69
7	Z Value	-1
8	P(X<=69)	0.15865526
9	Right Tail Probability	
10	P(X>=69)	0.84134474
11	Interval Probability	
12	Second X value	81
13	P(X<=81)	0.84134474
14	P(69<X<81)	0.68268948
15	Finding a X Value	
16	Cumulative Percent	0.1
17	Z Value	-1.281550794
18	X Value	67.31069523

FIGURE P.3.EXCEL **Design for computing normal probabilities illustrated for the individually trained factory worker (with $\mu = 75$ and $\sigma = 6$).**

What If Examples

One of the advantages of using a spreadsheet application like Microsoft Excel is that it facilitates the use of "What if" analyses, which enable the student to explore the effect of changing data values. An example of such an analysis occurs in the computation of probabilities under the normal curve. Figure P.3.Excel, illustrated above, shows the use of Excel to find a probability under the normal curve.

For this situation, if we change the standard deviation to 10 we obtain the results shown in Figure P.4.Excel.

D1

	A	B
1	Calculating Normal Probabilities	
2		
3	Arithmetic Mean	75
4	Standard Deviation	10
5	Left Tail Probability	
6	First X Value	69
7	Z Value	-0.6
8	P(X<=69)	0.274253065
9	Right Tail Probability	
10	P(X>=69)	0.725746935
11	Interval Probability	
12	Second X value	81
13	P(X<=81)	0.725746935
14	P(69<X<81)	0.45149387
15	Finding a X Value	
16	Cumulative Percent	0.1
17	Z Value	-1.281550794
18	X Value	62.18449206

FIGURE P.4.EXCEL **Design for computing normal probabilities illustrated for the individually trained factory worker (with $\mu = 75$ and $\sigma = 10$).**

Numerous problems throughout the text include parts that ask the student to do this type of "What if" analysis. These problems are marked with an Excel icon next to the part that requires a "What if" analysis. This type of sensitivity analysis enhances understanding of the particular topic studied. To facilitate the use of numerous "What if" analyses, the Excel Scenario Manager feature is covered in the supplement to Chapter 1.

About the Diskette that Accompanies This Text

The diskette that accompanies this text includes Excel workbooks for all examples discussed in the text and all problems denoted with an Excel icon . The diskette also contains two visual basic for application modules. The first one (MOUSING.XLS) allows novices (and all others) to practice the mousing skills needed when using Microsoft Excel. The illustration below represents one portion of this workbook.

The second module enables the user to generate a stem-and-leaf display from a set of values on a worksheet. All of these workbooks have been designed for and will load properly in Versions 5.0 or later of Microsoft Excel for the Macintosh, Windows 3.1, or Windows 95.

The diskette also includes files containing the data for the problems and examples in the text marked with a data disk icon in the margin. These files can be imported into Microsoft Excel using the Text Import Wizard as discussed in Chapter 1S. (Technical details about the diskette, including a complete list of the contents of the diskette, are given in Appendix F.)

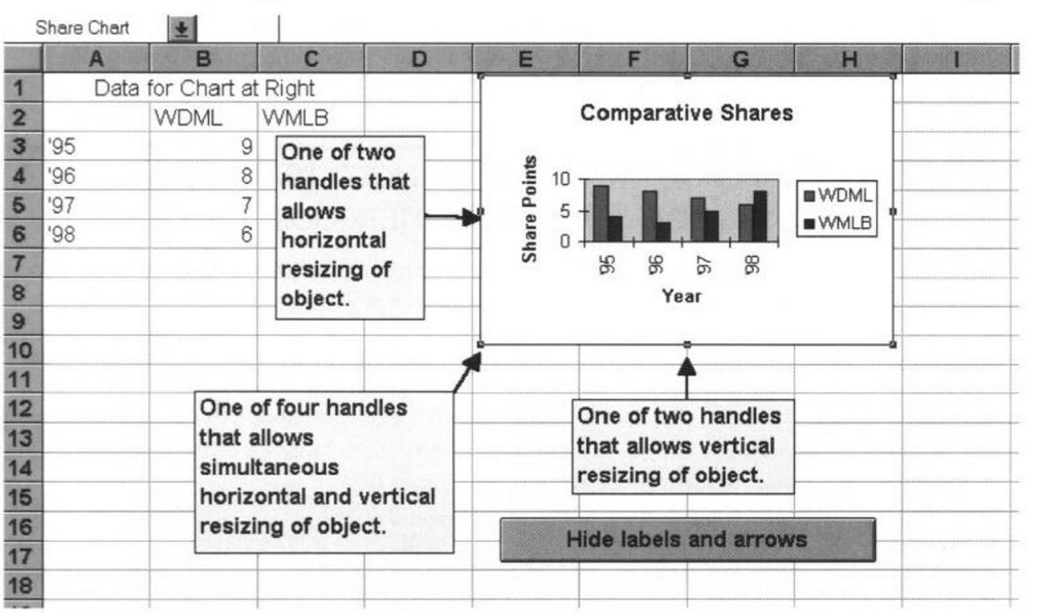

FIGURE P.5.EXCEL Level 4 of mousing program.

Using Microsoft Excel

This text and the Excel workbook files on the diskette that accompanies this text have been designed for use with any of the following three versions of Microsoft Excel:

Version 5 (or 5.0c) for Windows 3.1

Version 7 for Windows 95

Version 5 for the Macintosh

These versions share the same command set and nearly identical dialog boxes for the operations related to the statistical analyses discussed in this text. (Section 1S.3, Using Microsoft Excel Dialog Boxes, details the differences between the three versions that occur when using dialog boxes for common computing tasks such as opening, saving, and printing files.)

As noted elsewhere, the instructions in the Excel sections of the text have been written to work equally well with any of the three versions. Although many of the instructions would also apply to Version 4 of Excel, this version should *not* be used for two reasons: Many problems are associated with the statistical routines in that earlier version and because Version 4 will not open any of the Excel workbooks included on the diskette that accompanies the text.

MAIN FEATURE: A STREAMLINED VERSION OF TOPICAL COVERAGE WITH SUFFICIENT BREADTH OF COVERAGE

The statistical coverage, as can be seen from the Table of Contents, provides more than sufficient breadth of coverage, although not the depth of coverage of other, more comprehensive texts such as Berenson and Levine's *Basic Business Statistics, 6th ed.* The first three chapters provide an introduction and cover tables, charts, and descriptive statistics. Chapters 4 and 5 discuss probability and probability distributions. Chapters 6–9 examine inference and hypothesis testing. Chapter 10 describes quality management. Chapters 11 and 12 talk about regression and multiple regression, and Chapter 13 ends the text with time series forecasting.

MAIN FEATURE: AN ENHANCED MANAGERIAL FOCUS FOR STATISTICAL METHODS

Although the statistical coverage in the text represents a more concise version of Berenson and Levine's *Basic Business Statistics, 6th ed.*, extensive rewriting provides for a more managerial focus. In numerous instances, notation has been simplified, and formulas such as Equation (3.7) below are written in words as well as statistical symbols.

The standard deviation is the square root of the sum of the squared differences around the arithmetic mean divided by the sample size minus 1.

$$S = \sqrt{\frac{\sum_{i=1}^{n}(X_i - \bar{X})^2}{n-1}} \qquad (3.7)$$

Many of the important pedagogical features of Berenson and Levine, *Basic Business Statistics, 6th ed.*, have been retained, including:

- Case Studies
- Thought-provoking action ACTION and "light bulb" problems

- Chapter-ending summary flow charts
- Team projects
- Discussion of ethical issues
- Extensive end-of-section and end-of-chapter problems with answers to selected problems indicated by the ● symbol. (Answers begin on page 703.)
- Extensive use of real data throughout the text
- Listing of Key Terms

About the World Wide Web Icon

This text has a home page on the World Wide Web WWW with an address of http://www.prenhall.com/phbusiness. This home page includes a variety of information, including:

- Alternative course outlines
- Teaching tips
- Diskette additions and updates
- Links to other sites containing data appropriate for statistics courses
- Microsoft Excel–related sites

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David M. Levine
Mark L. Berenson
David Stephan

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