Hector Guerrero

Excel Data Analysis

Modeling and Simulation

Second Edition

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To my parents . . ..Paco and Irene

Preface

Why Does the World Need—*Excel Data Analysis, Modeling, and Simulation*?

When spreadsheets first became widely available in the early 1980s, it spawned a revolution in teaching. What previously could only be done with arcane software and large-scale computing was now available to the *common man*, on a desktop. Also, before spreadsheets, most substantial analytical work was done outside the classroom where the tools were; spreadsheets and personal computers moved the work into the classroom. Not only did it change how the data analysis curriculum was taught, but it also empowered students to venture out on their own to explore new ways to use the tools. I can't tell you how many phone calls, office visits, and/or emails I have received in my teaching career from ecstatic students crowing about what they have just done with a spreadsheet model.

I have been teaching courses related to business and data analytics and modeling for over 40 years, and I have watched and participated in the spreadsheet revolution. During that time, I have been a witness to the following important observations:

- Each successive year has led to more and more demand for Excel-based analysis and modeling skills, both from students, practitioners, and recruiters.
- Excel has evolved as an ever more powerful suite of tools, functions, and capabilities, including the recent iteration and basis for this book—Excel 2013.
- The ingenuity of Excel users to create applications and tools to deal with complex problems continues to amaze me.
- Those students who preceded the spreadsheet revolution often find themselves at a loss as to where to go for an introduction to what is commonly taught to most undergraduates in business and sciences.

Each one of these observations has motivated me to write this book. The first suggests that there is no foreseeable end to the demand for the skills that Excel enables; in fact, the need for continuing productivity in all economies guarantees that an individual with proficiency in spreadsheet analysis will be highly prized by an

organization. At a minimum, these skills permit you freedom from *specialists* that can delay or hold you captive while waiting for a solution. This was common in the early days of information technology (IT); you requested that the IT group provide you with a solution or tool and you waited, and waited, and waited. Today if you need a solution you can do it yourself.

The combination of the second and third observations suggests that when you couple bright and energetic people with powerful tools and a good learning environment, wonderful things can happen. I have seen this throughout my teaching career, as well as in my consulting practice. The trick is to provide a teaching vehicle that makes the analysis accessible. My hope is that this book is such a teaching vehicle. I believe that there are three simple factors that facilitate learning—select examples that contain interesting questions, methodically lead students through the rationale of the analysis, and thoroughly explain the Excel tools to achieve the analysis.

The last observation has fueled my desire to lend a hand to the many students who passed through the educational system *before* the spreadsheet analysis revolution: to provide them with a book that points them in the right direction. Several years ago, I encountered a former MBA student in a Cincinnati Airport bookstore. He explained to me that he was looking for a good Excel-based book on data analysis and modeling—"You know it's been more than 20 years since I was in a Tuck School classroom, and I desperately need to understand what my interns seem to be able to do so easily." By providing a broad variety of exemplary problems, from *graphical/statistical analysis* to *modeling/simulation* to *optimization*, and the Excel tools to accomplish these analyses, most readers should be able to achieve success in their self-study attempts to master spreadsheet analysis. Besides a good compass, students also need to be made aware of *the possible*. It is not usual to hear from students "Can you use Excel to do *this*?" or "I didn't know you could do *that* with Excel!"

Who Benefits from This Book?

This book is targeted at the student or practitioner who is looking for a *single* introductory Excel-based resource that covers three essential business skills—data analysis, business modeling, and simulation. I have successfully used this material with undergraduates, MBAs, and executive MBAs and in executive education programs. For my students, the book has been the main teaching resource for both semester and half-semester long courses. The examples used in the books are sufficiently flexible to guide teaching goals in many directions. For executives, the book has served as a compliment to classroom lectures, as well as an excellent post-program, self-study resource. Finally, I believe that it will serve practitioners, like that former student I met in Cincinnati, who have the desire and motivation to refurbish their understanding of data analysis, modeling, and simulation concepts through self-study.

Key Features of This Book

I have used a number of examples in this book that I have developed over many years of teaching and consulting. Some are brief and to the point; others are more complex and require considerable effort to digest. I urge you to not become frustrated with the more complex examples. There is much to be learned from these examples, not only the analytical techniques, but also *approaches* to solving complex problems. These examples, as is always the case in real world, messy problems, require making reasonable assumptions and some concession to simplification if a solution is to be obtained. My hope is that the approach will be as valuable to the reader as the analytical techniques. I have also taken great pains to provide an abundance of Excel screen shots that should give the reader a solid understanding of the chapter examples.

But, let me vigorously warn you of one thing—this is not an Excel *how-to* book. Excel *how-to* books concentrate on the Excel tools and not on analysis—it is assumed that you will fill in the analysis blanks. There are many excellent Excel *how-to* books on the market and a number of excellent websites (e.g., MrExcel.com) where you can find help with the details of specific Excel issues. I have attempted to write a book that is about analysis, analysis that can be easily and thoroughly handled with Excel. Keep this in mind as you proceed. So in summary, remember that the analysis is the primary focus and that Excel simply serves as an excellent vehicle by which to achieve the analysis.

Second Edition

The second edition of this book has updated to the current version of Excel, 2013. The additions and changes to Excel, since the first publication of the book, have been significant; thus, a revision was requested by many users. Additionally, topics have been extended for a more complete coverage. For example, in Chaps. 2–6 a more in-depth discussion of statistical techniques (sampling, confidence interval analysis, regression, and graphical analysis) is provided. Also, in numerous passages, changes have been made to provide greater ease of understanding.

Williamsburg, VA, USA Hector Guerrero

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About the Author

Hector Guerrero is a Professor Emeritus at Mason School of Business at the College of William and Mary, in Williamsburg, Virginia. He teaches in the areas of business analytics, decision making, statistics, operations, and business quantitative methods. He has previously taught at the Amos Tuck School of Business at Dartmouth College and the College of Business of the University of Notre Dame. He is well known among his students for his quest to bring clarity to complex decision problems.

He earned a PhD in Operations and Systems Analysis at the University of Washington and a BS in Electrical Engineering and an MBA at the University of Texas. He has published scholarly work in the areas of operations management, product design, and catastrophic planning.

Prior to entering academe, he worked as an engineer for Dow Chemical Company and Lockheed Missiles and Space Co. He is also very active in consulting and executive education with a wide variety of clients—U.S. Government, international firms, as well as many small and large U.S. manufacturing and service firms.

It is not unusual to find him relaxing on a quiet beach with a challenging Excel workbook and an excellent cabernet.