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Excel 2010

Data Analysis and Business Modeling

Wayne L. Winston



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Microsoft® Excel® 2010: Data Analysis and Business Modeling

Wayne L. Winston

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Introduction

Whether you work for a Fortune 500 corporation, a small company, a government agency, or a not-for-profit organization, if you're reading this introduction the chances are you use Microsoft Excel in your daily work. Your job probably involves summarizing, reporting, and analyzing data. It might also involve building analytic models to help your employer increase profits, reduce costs, or manage operations more efficiently.

Since 1999, I've taught thousands of analysts at organizations such as 3M, Bristol-Myers Squibb, Cisco Systems, Drugstore.com, eBay, Eli Lilly, Ford, General Electric, General Motors, Intel, Microsoft, NCR, Owens Corning, Pfizer, Proctor & Gamble, Tellabs, the U.S. Army, the U.S. Department of Defense, and Verizon how to use Excel more efficiently and productively in their jobs. Students have often told me that the tools and methods I teach in my classes have saved them hours of time each week and provided them with new and improved approaches for analyzing important business problems. Most of these classes used Excel 2003 or Excel 2007. With the added power of Excel 2010, you can be more productive than you ever dreamed! To paraphrase Alicia Silverstone in the movie *Clueless*, Excel 2007 is so five years ago.

I've used the techniques described in this book in my own consulting practice to solve many business problems. For example, I use Excel to help the Dallas Mavericks NBA basketball team evaluate referees, players, and lineups. During the last 15 years I have also taught Excel business modeling and data analysis classes to MBA students at Indiana University's Kelley School of Business. (As proof of my teaching excellence, I have won MBA teaching awards for 25 consecutive years, and have won the school's overall MBA teaching award five times.) I would like to also note that 95 percent of MBA students at Indiana University take my spreadsheet modeling class even though it is an elective.

The book you have in your hands is an attempt to make these successful classes available to everyone. Here is why I think the book will help you learn how to use Excel more effectively:

- The materials have been tested while teaching thousands of analysts working for Fortune 500 corporations and government agencies, including the U.S. Army.
- I've written the book as though I am talking to the reader. I hope this approach transfers the spirit of a successful classroom environment to the written page.
- I teach by example, which makes concepts easier to master. These examples are constructed to have a real-world feel. Many of the examples are based on questions sent to me by employees of Fortune 500 corporations.
- For the most part, I lead you through the approaches I take in Excel to set up and answer a wide range of data analysis and business questions. You can follow along with my explanations by referring to the sample worksheets that accompany each example.

However, I have also included template files for the book's examples on the companion website. If you want to, you can use these templates to work directly with Excel and complete each example on your own.

- For the most part, the chapters are short and organized around a single concept. You should be able to master the content of most chapters with at most two hours of study. By looking at the questions that begin each chapter, you'll gain an idea about the types of problems you'll be able to solve after mastering a chapter's topics.
- In addition to learning about Excel formulas, you will learn some important math in a fairly painless fashion. For example, you'll learn about statistics, forecasting, optimization models, Monte Carlo simulation, inventory modeling, and the mathematics of waiting in line. You will also learn about some recent developments in business thinking, such as real options, customer value, and mathematical pricing models.
- At the end of each chapter, I've provided a group of practice problems (over 600 in total) that you can work through on your own. These problems will help you master the information in each chapter. Answers to all problems are included in files on the book's companion website. Many of these problems are based on actual problems faced by business analysts at Fortune 500 companies.
- Most of all, learning should be fun. If you read this book, you will learn how to predict U.S. presidential elections, how to set football point spreads, how to determine the probability of winning at craps, and how to determine the probability of a specific team winning an NCAA tournament. These examples are interesting and fun, and they also teach you a lot about solving business problems with Excel.
- To follow along with this book, you must have Excel 2010. Previous versions of this book can be used with Excel 2003 or Excel 2007.

What You Should Know Before Reading This Book

To follow the examples in this book you do not need to be an Excel guru. Basically, the two key actions you should know how to do are the following:

- **Enter a formula** You should know that formulas must begin with an equal sign (=). You should also know the basic mathematical operators. For example, you should know that an asterisk (*) is used for multiplication, a forward slash (/) is used for division, and the caret key (^) is used to raise a quantity to a power.
- **Work with cell references** You should know that when you copy a formula that contains a cell reference such as \$A\$4 (an absolute cell reference, which is created by including the dollar signs), the formula still refers to cell A4 in the cells you copy it to. When you copy a formula that contains a cell reference such as \$A4 (a mixed cell address), the column remains fixed, but the row changes. Finally, when you copy a formula that contains a cell reference such as A4 (a relative cell reference), both the row and the column of the cells referenced in the formula change.

How to Use This Book

As you read along with the examples in this book, you can take one of two approaches:

- You can open the template file that corresponds to the example you are studying and complete each step of the example as you read the book. You will be surprised how easy this process is and amazed with how much you learn and retain. This is the approach I use in my corporate classes.
- Instead of working in the template, you can follow my explanations as you look at the final version of each sample file.

Using the Companion Content

This book features a companion website that makes available to you all the sample files you use in the book's examples (both the final Excel workbooks and starting templates you can work with on your own). The workbooks and templates are organized in folders named for each chapter. The answers to all chapter-ending problems in the book are also included with the sample files. Each answer file is named so that you can identify it easily. For example, the file containing the answer to Problem 2 in Chapter 10 is named s10_2.xlsx.

To work through the examples in this book, you need to copy the book's sample files to your computer. These practice files, and other information, can be downloaded from the book's detail page, located at:

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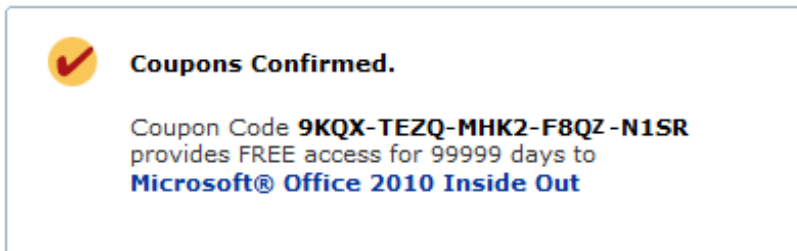
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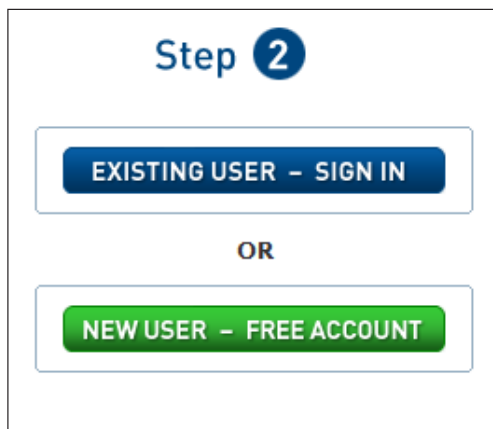
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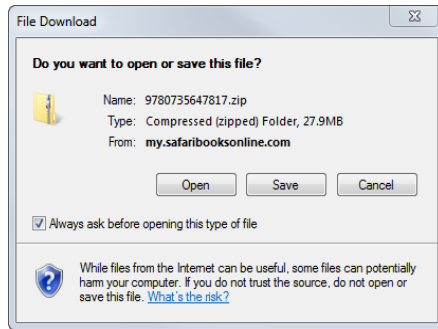
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I was blessed to work with John Pierce again, who edited the first edition of the book. Mitch Tulloch did a great job with the technical editing. Thanks also to Steve Sagman for managing the book's production and to proofreader Tom Speeches. Microsoft Press editors Rosemary Caperton and Devon Musgrave helped shepherd the project to completion.

I am grateful to my many students at the organizations where I've taught and at the Kelley School of Business. Many of them have taught me things I did not know about Excel.

Alex Blanton, formerly of Microsoft Press, championed this project at the start and shared my vision of developing a user-friendly text designed for use by business analysts.

Finally, my lovely and talented wife, Vivian, and my wonderful children, Jennifer and Gregory, put up with my long weekend hours at the keyboard.

Chapter 1

What's New in Excel 2010

Microsoft Excel 2010 contains many new features that are helpful to the business analyst, including these:

- **Customizable ribbon** Now you can completely customize the appearance of the ribbon.
- **Sparklines** Cool graphs that summarize lots of data in a single cell.
- **Slicers** Dashboard controls that make “slicing and dicing” PivotTable calculations much easier.
- **PowerPivot** A free add-in that enables you to quickly create PivotTables with up to 100 million rows of data based on data from many sources (databases, spreadsheets, and websites).
- **Solver** An improved Solver allows you to find the “best” solution to many business problems for which previous versions of the Solver returned incorrect answers.
- **File tab** The new File tab on the ribbon replaces the Office button and allows easy access to the File and Print menus.
- **Updated statistical functions** The accuracy of Excel statistical functions has been improved, and several new functions (including RANK.EX, AGGREGATE, WORKDAY.INTL, and NETWORKDAYS.INTL) have been added.
- **Equations** You can now edit equations in Excel by using an equation editor that is similar to the Microsoft Word equation editor.
- **Data bars** Data bars have been improved.
- **Paste Special** Paste Special options now include a live preview.

Let's now examine each of these exciting new features in more detail.

Customizable Ribbon

In Excel 2007, users were not able to customize the tabs displayed across the top of the ribbon. In Excel 2010, it is easy to customize the appearance of the ribbon tabs. Begin by selecting File in the upper-left portion of the ribbon. After choosing Options, you'll see the Customize Ribbon page shown in Figure 1-1.

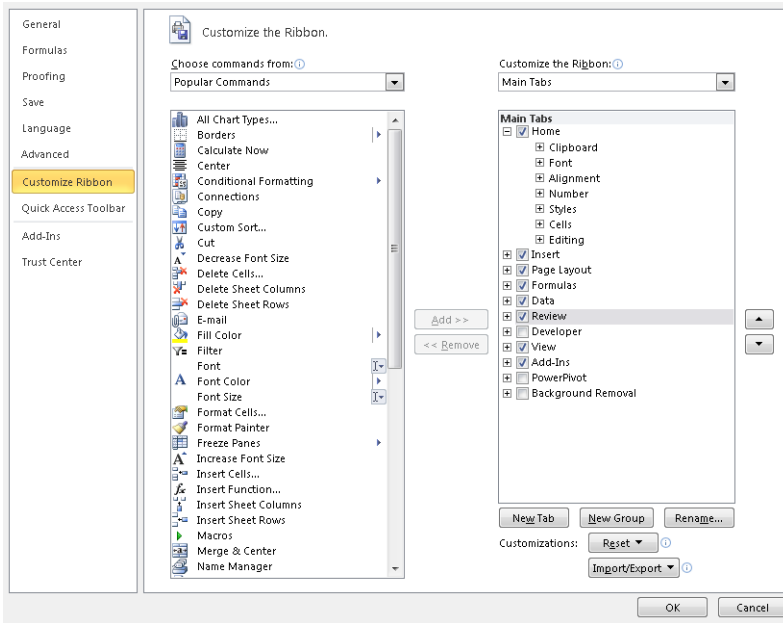


FIGURE 1-1 How to customize the ribbon.

As an example, suppose you want to show the Developer tab. Simply select Developer in the list at the right, and click OK. You can change the order in which the tabs appear by selecting a tab, and then using the Move Up and Move Down arrows on the right. If you click the drop-down arrow by Main Tabs, you can display Tool tabs. Then you can customize the tabs that appear when a given object is selected. For example, if you clear Design under Chart Tools, when you select a Chart object, the Design tab does not appear. Clicking the New Tab button allows you to create a new tab, and the New Group button lets you create a group within a tab. Of course, you can use the Rename button to change the name of a group or tab.

Don't Forget About the Quick Access Toolbar

The Quick Access Toolbar is an old friend from Excel 2007 that can still be very useful. You probably use some Excel commands much more often than others. Having to switch between tabs to find the command you need might slow you down. The Quick Access Toolbar (see Figure 1-2) allows you to collect your favorite commands in one place. The default location of the Quick Access Toolbar is above the ribbon in the upper-left portion of the Excel window.



FIGURE 1-2 Quick Access Toolbar.

You can add a command to the Quick Access Toolbar simply by right-clicking the command and choosing Add To Quick Access Toolbar. You can also add commands by clicking File in the upper-left portion of the ribbon. Next click Options, and then display the Customize the Quick Access Toolbar page (shown in Figure 1-3). After choosing a command you want to add, select Add, and click OK. Of course, the Move Up and Move Down arrows let you customize the order in which icons appear. You can remove any command from the Quick Access Toolbar by right-clicking the command, and then clicking Remove From Quick Access Toolbar. You can move the Quick Access Toolbar below the ribbon by right-clicking the toolbar, and selecting Show Below The Ribbon.

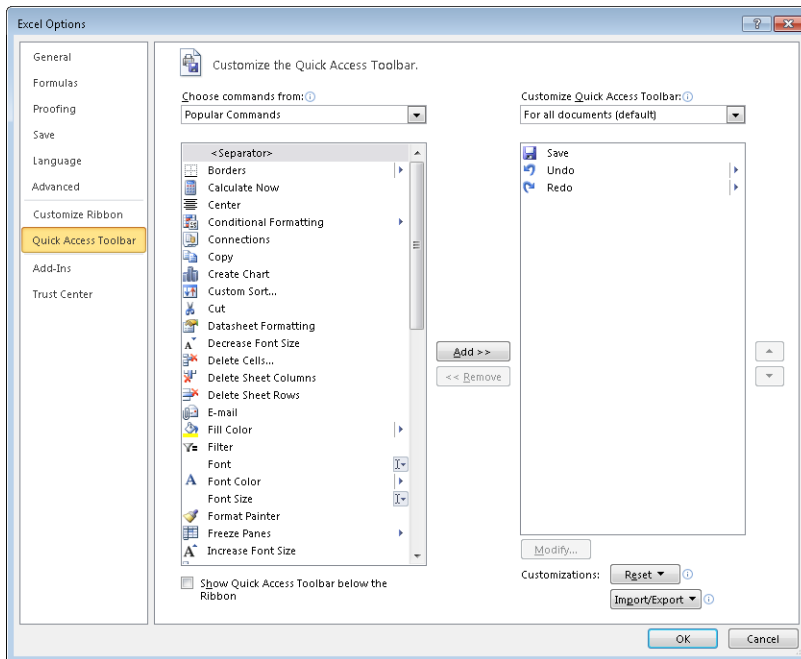


FIGURE 1-3 You can add, remove, and arrange commands on the Quick Access Toolbar.

People sometimes have trouble finding commands that appeared in earlier versions of Excel but seem to have disappeared from Excel 2010. For example, you might be a fan of the old method used to create PivotTables: the layout method. If you still want to use the layout method, you can find it by clicking the drop-down arrow to the right of Popular Commands and choosing Commands Not In The Ribbon. After scrolling down (pressing the P key several times is probably quicker!), you will find the PivotTable And PivotChart Wizard command, which you can then add to your Quick Access Toolbar.

Sparklines

Sparklines are small charts or graphs that fit in a single cell. Sparklines let you place a graphical summary of data next to the data. Figure 1-4 shows how sparklines can summarize daily customer counts at bank branches.

City	Monday	Tuesday	Wednesday	Thursday	Friday	Summary
New York	1176	768	808	864	1235	
Rochester	475	323	333	356	515	
Utica	360	250	228	275	378	
Syracuse	594	412	408	459	618	
Buffalo	698	475	504	551	803	
Ossining	306	208	204	234	322	
Ithaca	437	288	294	299	450	

FIGURE 1-4 Example of sparklines.

The sparklines make it clear that each branch is busiest on Monday and Friday. Sparklines are discussed in Chapter 44, “Sparklines.”

Slicers

PivotTables are probably the single most used tool for summarizing data. PivotTables let you “slice and dice your data” and are discussed in Chapter 43, “Using PivotTables and Slicers to Summarize Data.” Excel 2010 allows you to use slicers to control the way you summarize your data. The Name and Product slicers in Figure 1-5 ensure that total sales for each month are computed for only the rows of data in which Eric and Rachel sold checking accounts or stock investment accounts. Slicers are also discussed in Chapter 43.

	A	B	C	D	E	F	G	H	I
4									
5	Row Labels	Sum of Dollars							
6	Jan	2085							
7	Feb	1794							
8	Mar	125							
9	Apr	606							
10	May	1924							
11	Jun	2093							
12	Aug	1773							
13	Sep	465							
14	Oct	4733							
15	Nov	1475							
16	Dec	1379							
17	Grand Total	18452							

FIGURE 1-5 Example of slicers.

PowerPivot

Organizations often have to create reports based on data from different data sources. For example, a bank might have customer data for each branch in a separate spreadsheet or database. The bank might then want to create a corporate summary of total sales based on the data from the individual branches. In the past, it has been difficult to create PivotTables from different data sources. PowerPivot is a free add-in for Excel 2010 that allows you to easily create PivotTables based on data from different websites, spreadsheets, or databases. Using PowerPivot, you can quickly create PivotTables based on up to 100 million rows of data! PowerPivot is discussed in Chapter 84.

New Excel Solver

The Excel Solver is used to find the best way to do something. For example, what is the cheapest way to meet customer demand by shipping products from factories to customers? Excel 2010 contains a much improved version of the Solver that allows you to use many important functions (such as IF, MAX, MIN, and ABS functions) in Solver models. With previous versions of Excel, use of these functions in a Solver model might cause the Solver to report an incorrect solution. I discuss the Excel Solver in Chapters 28–37.

File Tab

Excel 2007 introduced the Office button. In Excel 2010, the Office button has been replaced by the File tab. The File tab is located at the left end of the ribbon. After selecting File, you are presented with the choices shown in Figure 1-6.