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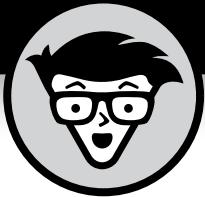
Model scenarios and
what-if analysis

Danielle Stein Fairhurst

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Financial Modeling in Excel® For Dummies®

Published by: **John Wiley & Sons, Inc.**, 111 River Street, Hoboken, NJ 07030-5774, www.wiley.com

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Published simultaneously in Canada

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Library of Congress Control Number: 2017936812

ISBN: 978-1-119-35754-4; ISBN 978-1-119-35755-1 (ebk); ISBN 978-1-119-35756-8 (ebk)

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

Contents at a Glance

Introduction	1
Part 1: Getting Started with Financial Modeling	5
CHAPTER 1: Introducing Financial Modeling	7
CHAPTER 2: Getting Acquainted with Excel	15
CHAPTER 3: Planning and Designing Your Financial Model	31
CHAPTER 4: Building a Financial Model by the Rulebook	49
CHAPTER 5: Using Someone Else's Financial Model.....	65
Part 2: Diving Deep into Excel	89
CHAPTER 6: Excel Tools and Techniques for Financial Modeling.....	91
CHAPTER 7: Using Functions in Excel	121
CHAPTER 8: Applying Scenarios to Your Financial Model	159
CHAPTER 9: Charting and Presenting Model Output	181
Part 3: Building Your Financial Model.....	211
CHAPTER 10: Building an Integrated Financial Statements Model.....	213
CHAPTER 11: Building a Discounted Cash Flow Valuation.....	247
CHAPTER 12: Budgeting for Capital Expenditure and Depreciation	257
Part 4: The Part of Tens	275
CHAPTER 13: Ten Strategies for Reducing Error	277
CHAPTER 14: Ten Common Pitfalls to Avoid	287
Index	299

Table of Contents

INTRODUCTION	1
About This Book.....	1
Foolish Assumptions.....	2
Icons Used in This Book	2
Beyond the Book.....	3
Where to Go from Here	3
PART 1: GETTING STARTED WITH FINANCIAL MODELING.....	5
CHAPTER 1: Introducing Financial Modeling.....	7
Defining Financial Modeling.....	7
What it is.....	8
Who uses it.....	9
Why it matters	9
Looking at Examples of Financial Models	10
Project finance models.....	11
Pricing models	11
Integrated financial statement models	12
Valuation models.....	12
Reporting models	13
CHAPTER 2: Getting Acquainted with Excel.....	15
Making Sense of the Different Versions of Excel	15
A rundown of recent Excel versions.....	16
Focusing on file formats.....	20
Defining Modern Excel	21
Recognizing the Dangers of Using Excel	23
Capacity.....	24
Lack of discipline	25
Errors.....	25
Looking at Alternatives and Supplements to Excel	28
CHAPTER 3: Planning and Designing Your Financial Model	31
Identifying the Problem That Your Financial Model Needs to Solve	31
Designing How the Problem's Answer Will Look.....	34
Gathering Data to Put in Your Model.....	39
Documenting the Limitations of Your Model	41

Considering the Layout and Design of Your Model	42
Structuring your model: What goes where	44
Defining inputs, calculations, and output blocks	45
Determining your audience.....	46
CHAPTER 4: Building a Financial Model by the Rulebook	49
Document Your Assumptions	49
Create Dynamic Formulas Using Links.....	54
Only Enter Data Once	56
Model with Consistent Formulas	57
Build in Error Checks.....	59
Allowing tolerance for error.....	61
Applying conditional formatting to an error check	61
Format and Label for Clarity	63
CHAPTER 5: Using Someone Else's Financial Model.....	65
Considering Templates for Building a Financial Model.....	66
Why templates can be appealing	66
What's wrong with using templates	66
Why you should build your own model.....	68
Inheriting a File: What to Check For	69
Meeting a model for the first time	69
Inspecting the workbook	71
Using Audit Tools to Find and Correct Errors	77
Checking a model for accuracy	78
Making sense of the formulas.....	82
PART 2: DIVING DEEP INTO EXCEL	89
CHAPTER 6: Excel Tools and Techniques for Financial Modeling	91
Referencing Cells.....	91
Relative cell referencing	93
Absolute cell referencing	95
Mixed cell referencing.....	97
Naming Ranges	100
Understanding why you may want to use a named range	100
Creating a named range.....	101
Finding and using named ranges	102
Editing or deleting a named range	104
Linking in Excel.....	104
Internal links.....	104
External links	107
Using Shortcuts	109

Restricting and Validating Data	113
Restricting user data entry.....	113
Creating drop-down boxes with data validations.....	115
Protecting and locking cells	116
Goal Seeking.....	117
Limiting project costs with a goal seek.....	117
Calculating a break-even point with a goal seek.....	118
CHAPTER 7: Using Functions in Excel.....	121
Identifying the Difference between a Formula and a Function	121
Finding the Function You Need.....	122
Getting Familiar with the Most Important Functions.....	123
SUM.....	123
MAX and MIN.....	125
AVERAGE	128
COUNT and COUNTA	129
ROUND, ROUNDUP, and ROUNDDOWN	135
IF.....	141
COUNTIF and SUMIF.....	145
VLOOKUP and HLOOKUP	148
Being Aware of Advanced Functions and Functionality.....	156
CHAPTER 8: Applying Scenarios to Your Financial Model.....	159
Identifying the Differences between Types of Analysis	160
Building Drop-Down Scenarios	161
Using data validations to model profitability scenarios.....	161
Applying formulas to scenarios.....	164
Applying Sensitivity Analysis with Data Tables	167
Setting up the calculation.....	167
Building a data table with one input.....	167
Building a data table with two inputs.....	170
Applying probability weightings to your data table	171
Using Scenario Manager to Model Loan Calculations	175
Setting up the model.....	175
Applying Scenario Manager.....	176
CHAPTER 9: Charting and Presenting Model Output.....	181
Deciding Which Data to Display	182
Conveying Your Message by Charting Scenarios	184
Deciding Which Type of Chart to Use	186
Line charts	187
Bar charts	192
Combo charts.....	194
Pie charts	196
Charts in newer versions of Excel.....	199

Dynamic Charting	204
Building the chart on formula-driven data	204
Linking the chart titles to formulas.....	205
Creating dynamic text.....	205
Preparing a Presentation	209
PART 3: BUILDING YOUR FINANCIAL MODEL	211
CHAPTER 10: Building an Integrated Financial Statements Model.....	213
Getting to Know the Case Study	214
Entering Assumptions.....	215
Revenue assumptions.....	216
Expense assumptions.....	217
Other assumptions	217
Calculating Revenue	219
Projecting sales volume	219
Projecting dollar sales.....	221
Calculating Expenses	222
Staff costs	222
Other costs	223
Depreciation and amortization	224
Building the Income Statement.....	227
Building the Cash Flow Statement	232
Building the Balance Sheet	236
Building Scenarios.....	241
Entering your scenario assumptions	242
Building a drop-down box	242
Building the scenario functionality	244
CHAPTER 11: Building a Discounted Cash Flow Valuation	247
Understanding How the Discounted Cash Flow Valuation Works.....	248
Step 1: Calculating Free Cash Flow to Firm	249
Step 2: Calculating Weighted Average Cost of Capital	252
Step 3: Finding the Terminal Value	253
Discounting Cash Flows and Valuation	254
CHAPTER 12: Budgeting for Capital Expenditure and Depreciation	257
Getting Started	258
Making a reusable budget model template.....	258
Creating dynamic titles	261
Output 1: Calculating Cash Required for Budgeted Asset Purchases.....	261

Output 2: Calculating Budgeted Depreciation	266
Useful life	267
Written-down date	268
The depreciation schedule for the current year.....	269
Depreciation in prior periods	271
Output 3: Calculating the Written-Down Value of Assets for the Balance Sheet.....	273
PART 4: THE PART OF TENS.....	275
CHAPTER 13: Ten Strategies for Reducing Error	277
Using the Enter Key.....	277
Checking Your Work	278
Checking It Again.....	279
Getting Someone Else to Check Your Work.....	280
Documenting Assumptions	280
Documenting Methodology with a Flowchart.....	281
Stress-Testing with Sensitivity Analysis	281
Conducting a Scenario Analysis.....	283
Taking Note of Excel Error Values.....	284
Including Error Checks	285
CHAPTER 14: Ten Common Pitfalls to Avoid.....	287
The Numbers Don't Add Up.....	287
You're Getting #REF! Errors	288
You Have Circular References	288
The Model Has Too Much Detail.....	290
The File Size Is Out of Control	291
Your Model Is Full of "Spaghetti" Links.....	293
The Formulas Are Unnecessarily Long and Complicated	295
No One Is Paying Attention to the Model	296
You Don't Want to Let Go.....	296
Someone Messes Up Your Model.....	297
INDEX.....	299

Introduction

I discovered financial modeling in Microsoft Excel when I worked in investment banking in London (as most young Aussies do). Back then, it wasn't even called "financial modeling," but I was hooked. Since those days, I've devoted my entire career to working in Excel and building models for the purpose of business cases, reports, budgets, and dashboards. I've worked with hundreds of clients in many different countries to help build their models for them or train them on how to build their own. Financial modeling in Excel takes me all over the world and I hope that it brings you the same fun and excitement!

About This Book

I wrote this book based on the experiences I've had with the many insightful people I've trained or worked with over the years. I cover the tools and techniques that are the most commonly needed for building models. This book is aimed at people who have a good smattering of Excel knowledge but want to improve their skills to perform better in their current roles or to get better jobs.

After reading this book, you'll know exactly what a financial modeler does and how to apply the principles of financial modeling to your work. You may not call yourself a "career" financial modeler. Instead, you might think of yourself as a "casual" modeler — maybe it's a side interest for you, or it's just one part of your job. But after reading this book, you may be bitten by the modeling bug and want to pursue a full-time career in this field!

You don't have to read this book from cover to cover — feel free to jump around and read the sections that are of most interest to you! In most cases, I demonstrate the tools and techniques covered by applying them to a simple model — usually what I would expect to be just *part* of a full financial model. In Part 3, you create three full financial models from start to finish. I encourage you to read this book with Excel open and not too far away because you'll want to try out many of the exercises and techniques described in these pages.

Foolish Assumptions

I assume just a few basic things about you. It goes without saying that you're highly intelligent because you recognize the value of having financial modeling skills. But I also assume that you have the following:

- » **A PC with a relatively recent version of Excel installed:** The screenshots and instructions in this book relate to Microsoft Excel 2016 and its capabilities. If you're using a Mac, or a previous version of Excel, you might find some of the instructions slightly different, but you should be able to find your way around.
- » **A working knowledge of Excel and a use for it:** I don't assume that you're an Excel expert, but you should at least know your way around and perhaps have created at least a few basic calculations before.
- » **Some kind of financial background:** You know what a set of financial statements looks like, you know what revenue is, and you know how interest calculations work. Some of the complexities are explained in this book, but I assume that these kinds of basic financial concepts are not entirely new to you.

Icons Used in This Book

This book is jam-packed with tips, tricks, warning, and ways to work smarter, faster, and more accurately.



TIP

Anything marked with the Tip icon will make your financial modeling quicker or easier.



REMEMBER

If I mark it with the Remember icon, it's really, really important and you should pay special attention.



WARNING

When you see the Warning icon, you know that I'm trying to save you the pain and agony of making a mistake (one that I've probably made many times myself).



TECHNICAL STUFF

I get very excited when talking or writing about financial modeling, so sometimes I get a little technical on you. Anything marked with the Technical Stuff icon isn't essential to your understanding of the surrounding text.

Beyond the Book

In addition to the material in the print or e-book you're reading right now, this product also comes with some access-anywhere goodies on the web. Check out the free Cheat Sheet for ten Excel functions that you absolutely need to know, tips on what to look for when auditing someone else's financial model, and the best keyboard shortcuts for financial modelers. To get this Cheat Sheet, simply go to www.dummies.com and type **Financial Modeling in Excel For Dummies Cheat Sheet** in the Search box.

You can also go to www.dummies.com/go/financialmodelinginexceffd for Excel files you can use to follow along with the exercises and examples in this book, as well as the completed versions of the financial models you build in Part 3.

Where to Go from Here

If you're just getting started and want to find out what all the fuss is about financial modeling, start at Chapter 1 and read on from there. If you're more technical and you want to get into something practical, Part 2 is a great place to start. Have a go at some of the shorter examples before getting started with the longer case studies in Part 3.

If you enjoy this book, I'd like to invite you to connect directly with me online through LinkedIn and other social media platforms. Search for the Financial Modeling in Excel LinkedIn group to join more than 40,000 other modelers and get involved in the active discussions! You can also subscribe to hear more about the world of financial modeling at www.plumsolutions.com.au/news, and I'd love to meet you at one of my upcoming events, or Financial Modelers' Meetups soon!

Have fun, and happy modeling!

1 **Getting Started with Financial Modeling**

IN THIS PART . . .

Explore the practical uses and examples of financial modeling.

Get to know Excel and identify the issues and risks for its use in building financial models.

Document and plan your model's layout and design.

Learn important guidelines to follow when building your financial model.

Find your way around an inherited financial model, and audit and check its output for accuracy.

IN THIS CHAPTER

- » Exploring the who, what, and why of financial modeling
- » Investigating different types of models

Chapter **1**

Introducing Financial Modeling

The demand for financial modeling skills has increased exponentially in recent years and many job listings for finance positions now include “financial modeling” as a core skill. If you’re reading this book, you’ve probably already discovered how important this skill is, and you know that learning financial modeling will increase your employability in finance or financially focused fields.

In this chapter, I define financial modeling — what it is, who uses it, and why it matters. I also show you some examples of financial models. If you’re brand-new to financial modeling, this chapter is a very good place to start.

Defining Financial Modeling

Before you dive into how to use Microsoft Excel to create financial models, you need to know what financial modeling is, who uses financial models, and why financial modeling matters. In this section, I fill you in.

What it is

When I teach a course on basic financial modeling, I always ask my students for their definitions of the term *financial model*. Most of them come up with long-winded descriptions using terms like *forecast* and *cash flow* and *hypothetical outcomes*. But I don't think the definition needs to be that complicated. A *financial model* is a tool (typically built in Excel) that displays possible solutions to a real-world financial problem. And *financial modeling* is the task of creating a financial model.

You may have thought that a financial model was basically just an Excel spreadsheet, but as you know, not every spreadsheet is a financial model. People can and do use Excel for all kinds of purposes. So, what makes a financial model distinct from a garden-variety spreadsheet? In contrast to a basic spreadsheet, a financial model

- » **Is more structured.** A financial model contains a set of variable assumptions — inputs, outputs, calculations, and scenarios. It often includes a set of standard financial forecasts — such as a profit-and-loss statement, a balance sheet, and a cash flow statement — which are based on those assumptions.
- » **Is dynamic.** A financial model contains inputs that, when changed, impact the calculations and, therefore, the results. A financial model always has built-in flexibility to display different outcomes or final calculations based on changing a few key inputs.
- » **Uses relationships between several variables.** When the user changes any of the input assumptions, a chain reaction often occurs. For example, changing the growth rate will change the sales volume; when the sales volume changes, the revenue, sales commissions, and other variable expenses will change.
- » **Shows forecasts.** Financial models are almost always looking into the future. Financial modelers often want to know what their financial projections will look like down the road. For example, if you continue growing at the same rate, what will your cash flow be in five years?
- » **Contains scenarios (hypothetical outcomes).** Because a model is looking forward instead of backward, a well-built financial model can be easily used to perform scenario and sensitivity analysis. What would happen if interest rates went up? How much can we discount before we start making a loss?

More broadly, a financial model is a structure (usually in Excel) that contains inputs and outputs, and is flexible and dynamic.

Who uses it

Many types of people build and use financial models for different purposes and goals. Financial models are usually built to solve real-world problems, and there are as many different financial models as there are real-world problems to solve. Generally, anyone who uses Excel for the purpose of finance will at some point in his career build a financial model for himself or others to use; at the very least, he'll use a model someone else created.

Bankers, particularly investment bankers, are heavy users of financial models. Due to the very nature of financial institutions, modeling is part of the culture of the company — the business's core is built on financial models. Banks and financial institutions must comply with current regulatory restrictions, and the tools and controls in place are forever changing and adapting. Because of the risk associated with lending and other financial activities, these institutions have very complex financial modeling systems in place to ensure that the risk is managed effectively. Anyone working in the banking industry should have at least a working knowledge of spreadsheets and financial models.

Outside the banking industry, accountants are big users of financial models. Bankers are often evaluating other companies for credit risk and other measures. An accountant's models, however, are often more inward looking, focusing on internal operations reporting and analysis, project evaluation, pricing, and profitability.

Why it matters

A financial model is designed to depict a real-life situation in numbers in order to help people make better financial decisions.

Wherever there are financial problems or situations in the real world that need solving, analyzing, or translating into a numerical format, financial models help. Sometimes it's just an idea or a concept that needs to be converted into a business case or feasibility proposal. A skilled financial modeler can put substance to the idea by augmenting the details enough to get a working model upon which decisions can be made, investor funds can be gained, or staff can be hired.

For example, financial models can help investors decide which project to put their money into, an executive track which marketing campaigns have the highest return on investment, or a factory production manager decide whether to purchase a new piece of machinery.

WHAT IT TAKES TO BE A FINANCIAL MODELER

Someone working with financial models typically has an undergraduate degree in business, finance, or commerce. Additionally, she likely has at least one of the following postgraduate qualifications:

- An accountancy qualification, such as CA (Certified Accountant), CPA (Certified Public Accountant), CIMA (Chartered Institute of Management Accountants), ACCA (Association of Chartered Certified Accountants), CMA (Certified Management Accountant), or CIA (Certified Internal Auditor)
- A Master of Business Administration (MBA) degree
- A Chartered Financial Analyst (CFA) designation
- A Financial Risk Manager (FRM) designation

Of course, you don't need all those letters after your name to build and work with financial models. I know many skilled modelers who come from backgrounds in IT or engineering, or who don't have any formal qualifications at all. Currently, there is no specific certification qualification for financial modeling professionals — at least nothing that is publicly recognized — but I expect this might change in the near future. You can find courses in financial modeling, however. For example, I run a five-day Certificate in Financial Modeling Using Excel course through George Washington University several times a year in Dubai. And I have colleagues who run similar programs. I would classify these kinds of program as short-course vocational training rather than full certification.

If you simply want to list financial modeling as a skill on your résumé, a short course is sufficient (backed up by at least a couple of models you've built in the real world). If you're aiming toward a financial modeling career, you'll need formal finance qualifications such as those listed here, as well as intense, practical, hands-on work experience.

Looking at Examples of Financial Models

When you then consider the benefits that a financial model can bring, it's difficult not to get carried away thinking of the application potential of a financial model! When you understand the principles of financial models, you can begin to look at the most common scenarios in which a model would be implemented.

There are a variety of categories of financial models:

- » **Project finance models:** When a large infrastructure project is being assessed for viability, the project finance model helps determine the capital and structure of the project.
- » **Pricing models:** These models are built for the purpose of determining the price that can or should be charged for a product.
- » **Integrated financial statement models (also known as a three-way financial model):** The purpose of this kind of model is to forecast the financial position of the company as a whole.
- » **Valuation models:** Valuation models value assets or businesses for the purpose of joint ventures, refinancing, contract bids, acquisitions, or other kinds of transactions or “deals.” (The people who build these kinds of models are often known as *deals modelers*.)
- » **Reporting models:** These models summarize the history of revenue, expenses, or financial statements (such as the income statement, cash flow statement, or balance sheet).

Modelers generally specialize in one or two of these model categories. You’ll see some overlap between each type of model category, but most models can be classified as one model type.

In this section, I show you some examples of scenarios and places in which these categories of financial models can come in handy, along with the functions and characteristics of each.

Project finance models

Loans and the associated debt repayments are an important part of project finance models, because these projects are normally long term, and lenders need to know whether the project is able to produce enough cash to service the debt. Metrics such as debt service cover ratio (DSCR) are included in the model and can be used as a measure of risk of the project, which may affect the interest rate offered by the lender. At the beginning of the project, the DSCR and other metrics are agreed upon between the lender and borrower such that the ratio must not go below a certain number.

Pricing models

The input to a pricing model is the price, and the output is the profitability. To create a pricing model, an income statement (or profit-and-loss statement) of the

business or product should be created first, based on the current price or a price that has been input as a placeholder. At a very high level:

$$\text{Units} \times \text{Price} = \text{Revenue}$$

$$\text{Revenue} - \text{Expenses} = \text{Profit}$$

Of course, this kind of model can be very complex and involve many different tabs and calculations, or it can be quite simple, on a single page. When this structure model is in place, the modeler can perform sensitivity analysis on the price entered using a goal seek (see Chapter 7) or a data table (see Chapter 8).

Integrated financial statement models

Not every financial model needs to contain all three types of financial statements, but many of them do, and those that do are known as integrated financial statement models. You may also hear them referred to as “three-way financial models.” The three types of financial statements included in an integrated financial statement model are the following:

- » Income statement, also known as a profit-and-loss (P&L) statement
- » Cash flow statement
- » Balance sheet

From a financial modeling perspective, it’s very important that when an integrated financial statement model is built, the financial statements are linked together properly so that if one statement changes, the others change as well. For an example of how to build an integrated financial statement model, turn to Chapter 12.

Valuation models

Building valuation models requires a specialized knowledge of *valuation theory* (using the different techniques of valuing an asset), as well as modeling skills. If you’re a casual financial modeler, you probably won’t be required to create from scratch a fully functioning valuation model. But you should at least have an idea of what types of valuation financial models are out there.

Here are three common types of valuation financial models you may encounter:

- » **Mergers and acquisitions (M&A):** These models are built to simulate the effect of two companies merging or one company taking over the other. M&A models are normally undertaken in a tightly controlled environment. Due to its confidential nature, an M&A model has fewer players than other kinds of models. The project moves quickly because time frames are tight. The few modelers working on an M&A model do so in a concentrated period of time, often working long hours to achieve a complex and detailed model.
- » **Leveraged buyout (LBO):** These models are built to facilitate the purchase of a company or asset with large amounts of debt to finance the deal, called a *leveraged buyout*. The entity acquiring the “target” company or asset usually finances the deal with some equity, using the target’s assets as security — in the same way that many home loan mortgages work. LBOs are a popular method of acquisition because they allow the entity to make large purchases without committing a lot of cash. Modeling is an important part of the LBO deal because of its complexity and the high stakes involved.
- » **Discounted cash flow (DCF):** These models calculate the cash expected to be received from the business or asset a company is considering purchasing, and then discounts that cash flow back into today’s dollars to see whether the opportunity is worth pursuing. Valuing the future cash flows expected from an acquisition is the most common modeling method of valuation. Intrinsic to the DCF methodology is the concept of the time value of money — in other words, that cash received today is worth a lot more than the same amount of cash received in future years. For an example of how to calculate DCF, turn to Chapter 11.

Reporting models

Because they look historically at what occurred in the past, some people argue that reporting models are not really financial models at all, but I disagree. The principles, layout, and design that are used to create a reporting model are identical to other financial models. Just because they contain historical rather than projected numbers doesn’t mean they should be categorized any differently.

In fact, reporting models are often used to create actual versus budget reports, which often include forecasts and rolling forecasts, which in turn are driven by assumptions and other drivers. Reporting models often start out as a simple income statement report, but end up being transformed into fully integrated financial statement models, pricing models, project finance models, or valuation models.

PUTTING “FINANCIAL MODELING” ON YOUR RÉSUMÉ

When you know exactly what’s involved in the modeling process and you have knowledge of financial modeling skills that you’ve used in the workplace, you’re ready to put “financial modeling” on your résumé.

Since the economic crisis of 2008, emphasis on financial modeling has increased. In response, there has been a rise in job descriptions specifying financial modeling as a core competency. If you’re applying for a job in finance, employers will no doubt look favorably upon this skill, as long as it rings true with the rest of your résumé. You need to be able to flesh out the tasks in previous positions you’ve held with examples of what kinds of models you built.

Although short vocational courses in financial modeling (see “What it takes to be a financial modeler,” earlier in this chapter) are well respected, what prospective employers really want to see is the *application* of financial modeling techniques in your everyday work.

Just reading this book or taking a financial modeling training course doesn’t mean you can add “financial modeling” to your résumé. You need to have actually *used* your modeling skills in the real-world environment. Take every opportunity to use models in your work. If you’re not currently employed, find example models online, take them apart, and see how you can improve them.

Whatever you do, don’t exaggerate when it comes to the level of experience you have with financial modeling. You may be asked in the interview to back up and discuss in great detail the intricacies of how you created a particular model.

IN THIS CHAPTER

- » Comparing different versions of Excel
- » Introducing Modern Excel
- » Recognizing the pitfalls of using Excel
- » Exploring alternatives to Excel

Chapter 2

Getting Acquainted with Excel

For most people, Microsoft Excel and financial modeling go hand in hand. Given the title of this book, it should come as no surprise to you that I assume you'll be using Excel. In order to build a financial model, you need at least a working knowledge of Excel. So, before jumping into the details of financial modeling, I'm going to introduce you to the tool you'll be using, Microsoft Excel.

Almost every financial model you'll come across will make use of Excel to some extent, but alternatives to Excel do exist, as do add-ins to improve Excel, both of which I cover in this chapter. Finally, I look at some of the issues and risks related to the use of Excel, just so you know what to expect.

Making Sense of the Different Versions of Excel

Every few years, Microsoft brings out a new version of Excel. For users who are comfortable with the way their version of Excel works, these changes are often met with apprehension or dismay. But for avid Excel fans like me, each new release is a cause for excitement! I'm always eager to find out what new tools and

features have been introduced to improve the process of building financial models in Excel.

Although major changes have been applied to Excel over the past few versions, the changes are less relevant for financial modelers than they are for some other folks. Why? Because many of the new features are visual, and financial modeling relies less on visual features and more on links and formulas, which haven't changed.



WARNING

Some new functions have been introduced in recent versions of Excel. If you build a model that contains these new functions and a user opens it in a previous version of Excel, he'll get a #N/A error. I recommend avoiding new functions when you're building a financial model, unless you're sure that anyone who needs to use your model will be using the same version of Excel as you.



TIP

If you're not sure whether you've used any functions or features not available in previous versions of Excel, use the Inspect Workbook tool (see Chapter 5) to find out.

And if you're not sure which version of Excel you're using, open Excel and choose File \Rightarrow Account \Rightarrow About Excel. At the top of the dialog box that appears, you'll see the version number. If that doesn't work, then you're probably using a very old version; choose Help \Rightarrow Resources \Rightarrow About.

A rundown of recent Excel versions

In this section, I walk you through some of the features introduced in recent versions of Excel. Although these lists are not exhaustive, they are the features you're most likely to use for the purposes of financial modeling and analysis.



TIP

If you have Excel on an Office 365 subscription plan, you get new features as soon as they roll out with each update, instead of having to wait for the next version of Excel.

Microsoft Excel 2016

In Excel 2016, the following features were added:

- » The **Tell Me What You Want to Do** box was added to the Ribbon. This box is a very user-friendly way of finding your way around Excel.
- » The following **new charts** were added: Waterfall, Treemap, Sunburst, Histogram, Box & Whisker, and Funnel. These new charts are a welcome addition to Excel and make it very easy to display the results of your financial model. But remember that if you insert any of these new charts into your