LEARNING MADE EASY

2nd Edition

Microsoft® Excel® Sales Forecasting

for dummies®

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Choose, manage, and present data

Select the right forecasting method for your business

Use moving averages and predict seasonal sales

Conrad Carlberg, PhD

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for dummies®

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Contents at a Glance

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Introduction

You wouldn't have pulled this book off the shelf if you didn't need to forecast sales. And I'm sure that you're not Nostradamus. Your office isn't filled with the smell of incense and it's not your job to predict the date that the world will come to an end.

But someone — perhaps you — wants you to forecast sales, and you find out how to do that here, using the best general-purpose analysis program around, Microsoft Excel.

About This Book

This book concentrates on using numbers to forecast sales. If you're a salesperson, or a sales manager, or someone yet higher up the org chart, you've run into forecasts that are based not on numbers but on guesses, sales quotas, wishful thinking, and Scotch.

I get away from that kind of thing here. I use numbers instead. Fortunately, you don't need to be a math major to use Excel for your forecasting. Excel has a passel of tools that will do it on your behalf. Some of them are even easy to use, as you'll see.

That said, it's not all about numbers. You still need to understand your products, your company, and your market before you can make a sensible sales forecast, and I have to trust you on that. I hope I can. I think I can. Otherwise, start with Part 1, which talks about the context for a forecast.

You can hop around the chapters in this book, as you can in all books that feature the guy with a pool ball rack for a head. There are three basic approaches to forecasting with numbers — moving averages, smoothing, and regression — and you really don't have to know much about one to understand another. It helps to know all three, but you don't really need to.

Foolish Assumptions

The phrase *foolish assumptions* is, of course, redundant. But here are the assumptions I'm making:

- **I'm assuming that you know the basics of how to use Excel.** Entering numbers into a worksheet, like numbers that show how much you sold in August 2015; entering formulas in worksheet cells; saving workbooks; using menus; that sort of thing.

  If you haven't ever used Excel before, don't start here. Do buy this book, but also buy *Excel 2013 For Dummies* by Greg Harvey (published by Wiley), and dip into that one first.

- **I'm assuming that you have access to information on your company's sales history, and the more the better.** The only way to forecast what's about to happen is to know what's happened earlier. Doesn't really matter where that information is — it can be in a database, or in an Excel workbook, or even in a simple text file. As long as you can get your hands on it, you can make a forecast. And I talk about how you can get Excel's "hands" on it.

- **I'm assuming you don't have a phobia about numbers.** You don't have to be some kind of egghead to make good forecasts. But you can't be afraid of numbers, and I really doubt that you are. Except maybe your quarterly sales quota.

- **Of course, I'm also assuming you have Excel on your computer.** I'm *not* assuming you have the latest version. But the Excel user interface changed so drastically in 2007 that I have to assume your version uses the Ribbon rather than the original menu structure. Even so, very little of the information in this book has to do with the user interface. Mostly, it's about setting up your sales history, letting yourself be guided by Excel's Data Analysis add-in, and finally working with worksheet formulas, charts, and other tools to get where you're headed on your own.

Icons Used in This Book

In the margins of this book, you find icons — little pictures that are designed to draw your attention to particular kinds of information. Here's what the icons mean:


TIP

Anything marked with this icon will make things easier for you, save you time, get you home in time for dinner. You get some of what I've distilled from all my years browsing those blasted newsgroups.

WARNING

Not a lot of warnings in this book, but there are a few. These tell you what to expect if you do something that Microsoft hasn't sufficiently protected you against. And there are some of those.

REMEMBER

A string around your finger. There are some things to keep in mind when you're doing your forecasts, and it's usually easier to remember them than to have to look them up over and over. I do want you to read this book over and over, as I do with murder mysteries, but you'll get your work done faster if you remember this stuff.

TECHNICAL STUFF

Speaking of stuff, anything marked with this icon is stuff you can probably ignore — but if you're having trouble getting to sleep you may want to read these. I don't get into heavy-duty mathematical issues here, but you see some special things about how Excel prepares your forecasts. Sleep tight.

Beyond the Book

In addition to what you're reading right now, this product also comes with a free access-anywhere Cheat Sheet that tells you about Excel data analysis add-in tools, how to use forecasting functions, what you get out of the Excel LINEST function, and what to do when setting up your baseline in Excel. To get this Cheat Sheet, simply go to `www.dummies.com` and search for "Excel Sales Forecasting For Dummies Cheat Sheet" in the Search box.

I've also provided files for each chapter so that you can try out what I'm talking about in the leisure of your own home. You can find these files at `www.dummies.com/go/excelsalesforecasting`.

Where to Go from Here

Are you looking for information about the basics of forecasting? Why it works? Why it's not just a self-licking ice cream cone? Start at Chapter 1.

Do you want to know how to put your data together in a workbook? Head to Chapter 5 to find out more about baselines, and then check out the chapters on using tables in Excel.

If you're already up on forecasting basics and tables, head for Chapter 8, where you'll see how to use pivot tables to set up the baseline for your forecast.

And if you know all that stuff already, just go to Chapter 10 and start looking at how to manage your forecasts yourself, without relying on the various tools that take care of things for you. You'll be glad you did.

1 Understanding Sales Forecasting and How Excel Can Help

IN THIS PART . . .

In Part 1, I talk about why forecasting sales can help your business in ways that seem to have little to do with sales. Part 1 also tells you why forecasting isn't simply a matter of using formulas to crunch numbers. But, face it, some numbers have to be crunched, and here you find an introduction to baselines — which are the basis for the number-crunching. I try to convince you that forecasting really does work, and I back up that claim by showing you how.

IN THIS CHAPTER

- Knowing the different methods of forecasting
- Arranging your data in an order Excel can use
- Getting acquainted with the Analysis ToolPak
- Going it alone

Chapter 1
A Forecasting Overview

A sales forecast is like a weather forecast: It's an educated guess at what the future will bring. You can forecast all sorts of things — poppy-seed sales, stock market futures, the weather — in all sorts of ways: You can make your own best guess; you can compile and composite other people's guesses; or you can forecast on the basis of wishful thinking.

Unfortunately, none of these options is truly acceptable. If you want to make better forecasts, you need to take advantage of some better options. And there *are* different ways to forecast, ways that have proven their accuracy over and over. They take a little more time to prepare than guessing does, but in the long run I've spent more time explaining bad guesses than doing the forecasts right in the first place.

Microsoft Excel was originally developed as a spreadsheet application, suited to figuring payment amounts, interest rates, account balances, and so on. But as Microsoft added more and more functions — for example, AVERAGE and TREND and inventory-management stuff — Excel became more of a multipurpose analyst than a single-purpose calculator.

Excel has the tools you need to make forecasts, whether you want to prepare something quick and dirty (and who doesn't from time to time?) or something sophisticated enough for a boardroom presentation.

The tools are there. You just need to know which tool to choose for which situation and, of course, how to use it. You need to know how to arrange data for the tool. And you need to know how to interpret what the tool tells you — whether that tool's a basic one or something more advanced.

Understanding Excel Forecasts

If you want to forecast the future — next quarter's sales, for example — you need to get a handle on what's happened in the past. So you always start with what's called a *baseline* (that is, past history — how many poppy seeds a company sold during each of the last ten years, where the market futures wound up each of the last 12 months, what the daily high temperature was year-to-date).

Unless you're going to just roll the dice and make a guess, you need a baseline for a forecast. Today follows yesterday. What happens tomorrow generally follows the pattern of what happened today, last week, last month, last quarter, last year. If you look at what's already happened, you're taking a solid step toward forecasting what's going to happen next. (Part 1 of this book talks about forecast baselines and why they work.)

An Excel forecast isn't any different from forecasts you make with a specialized forecasting program. But Excel is particularly useful for making sales forecasts, for a variety of reasons:

- **You often have sales history recorded in an Excel worksheet.** When you already keep your sales history in Excel, basing your forecast on the existing sales history is easy — you've already got your hands on it.
- **Excel's charting features make it much easier to visualize what's going on in your sales history and how that history defines your forecasts.**
- **Excel has tools (found in what's called the Data Analysis add-in) that make generating forecasts easier.** You still have to know what you're doing and what the tools are doing — you don't want to just jam the numbers through some analysis tool and take the result at face value, without understanding what the tool's up to. But that's what this book is here for.

» **You can take more control over how the forecast is created by skipping the Data Analysis add-in's forecasting tools and entering the formulas yourself.** As you get more experience with forecasting, you'll probably find yourself doing that more and more.

You can choose from several different forecasting methods, and it's here that judgment begins. The three most frequently used methods, in no special order, are moving averages, exponential smoothing, and regression.

Method #1: Moving averages

Moving averages may be your best choice if you have no source of information other than sales history — but you *do* need to know your baseline sales history. Later in this chapter, I show you more of the logic behind using moving averages. The underlying idea is that market forces push your sales up or down. By averaging your sales results from month to month, quarter to quarter, or year to year, you can get a better idea of the longer-term trend that's influencing your sales results.

For example, you find the average sales results of the last three months of last year — October, November, and December. Then you find the average of the next three-month period — November, December, and January (and then December, January, and February; and so on). Now you're getting an idea of the general direction that your sales are taking. The averaging process evens out the bumps you get from discouraging economic news or temporary boomlets.

Method #2: Exponential smoothing

Exponential smoothing is closely related to moving averages. Just as with moving averages, exponential smoothing uses past history to forecast the future. You use what happened last week, last month, and last year to forecast what will happen next week, next month, or next year.

The difference is that when you use smoothing, you take into account how bad your previous forecast was — that is, you admit that the forecast was a little screwed up. (Get used to that — it happens.) The nice thing about exponential smoothing is that you take the error in your last forecast and use that error, so you hope, to improve your next forecast.

If your last forecast was too low, exponential smoothing kicks your next forecast up. If your last forecast was too high, exponential smoothing kicks the next one down.

The basic idea is that exponential smoothing corrects your next forecast in a way that would have made your *prior* forecast a better one. That's a good idea, and it usually works well.

Method #3: Regression

When you use regression to make a forecast, you're relying on one variable to predict another. For example, when the Federal Reserve raises short-term interest rates, you might rely on that variable to forecast what's going to happen to bond prices or the cost of mortgages. In contrast to moving averages or exponential smoothing, regression relies on a *different* variable to tell you what's likely to happen next — something other than your own sales history.

Getting the Data Ready

Which method of forecasting you use does make a difference, but regardless of your choice, in Excel you have to set up your baseline data in a particular way. Excel prefers it if your data is in the form of a *table.* In Part 2, I fill you in on how to arrange your data so that it best feeds your forecasts, but following is a quick overview.

Using tables


TIP

There's nothing mysterious about an Excel table. A table is something very much like a database. Your Excel worksheet has columns and rows, and if you put a table there, you just need to manage three requirements:

- **Keep different variables in different columns.** For example, you can put sales dates in one column, sales amounts in another column, sales reps' names in another, product lines in yet another.
- **Keep different records in different rows.** When it comes to recording sales information, keep different sales records in different rows. Put information about a sale that was made on January 15 in one row, and information about a sale made on January 16 in a different row.
- **Put the names of the variables in the table's first row.** For example, you might put "Sales Date" in column A, "Revenue" in column B, "Sales Rep" in column C, and "Product" in column D.

Figure 1-1 shows a typical Excel table.

	A	B	C	D
1	Sales Date	Revenue	Sales Rep	Product
2	10/6/2016	$ 7,678.26	Jones	Services
3	10/7/2016	$ 8,253.70	Tafoya	Services
4	10/11/2016	$ 3,052.08	James	Warranty
5	10/12/2016	$ 4,153.27	Turgidson	Hardware
6	10/15/2016	$ 5,701.64	Anderson	Hardware
7	10/13/2016	$ 6,382.83	Jones	Services
8	10/15/2016	$ 2,864.20	Anderson	Maintenance
9	10/17/2016	$ 6,379.38	Coulter	Warranty
10	10/20/2016	$ 1,680.76	James	Services
11	10/10/2016	$ 6,639.68	Jones	Services
12	10/14/2016	$ 6,190.50	James	Software
13	10/10/2016	$ 6,721.69	Wilson	Hardware
14	10/19/2016	$ 4,996.28	Anderson	Maintenance
15	10/8/2016	$ 5,383.12	Coulter	Maintenance
16	10/20/2016	$ 4,742.58	Jones	Hardware
17	10/17/2016	$ 5,369.55	James	Software
18	10/18/2016	$ 1,837.77	Wilson	Warranty
19	10/12/2016	$ 2,727.85	Wilson	Software
20	10/22/2016	$ 1,141.00	Wilson	Hardware
21	10/15/2016	$ 7,633.23	Turgidson	Software
22	10/19/2016	$ 8,797.87	Coulter	Maintenance
23	10/18/2016	$ 4,859.78	James	Services
24	10/16/2016	$ 6,296.67	Coulter	Services

FIGURE 1-1: You don't have to keep the records in date order — you can handle that later.

Why bother with tables? Because many Excel tools, including the ones you use to make forecasts, rely on tables. Charts — which help you visualize what's going on with your sales — rely on tables. Pivot tables — which are the most powerful way you have for summarizing your sales results in Excel — rely heavily on tables. The Data Analysis add-in — a very useful way of making forecasts — relies on tables, too.

For years, Excel depended on an informal arrangement of data called a *list*. A list looked a lot like a table does now, with field names in its first row, followed by records. But a list did not have built-in properties such as record counts or filters or total rows or even a name. You had to take special steps to identify the number of rows and columns the list occupied.

In Excel 2007, Microsoft added tables as a new feature, and tables have all those things that lists lack. One aspect of tables is especially useful for sales forecasting. As time passes and you get more information about sales figures, you want to add the new data to your baseline. Using lists, you had to define what's called a *dynamic range name* to accommodate the new data. With tables, all you need to do is provide a new record, usually in a new row at the end of the table. When you do so, the table is automatically extended to capture the new data. Anything in the

workbook — charts, formulas, whatever — is also automatically updated to reflect the new information. Tables are a major improvement over lists and this book makes extensive use of them.

You find a lot more about creating and using tables in Chapter 6. In the meantime, just keep in mind that a table has different variables in different columns, and different records in different rows.

Ordering your data

"Ordering your data" may sound a little like "coloring inside the lines." The deal is that you have to tell Excel how much you sold in 1999, and then how much in 2000, and in 2001, and so on. If you're going to do that, you have to put the data in chronological order.

The very best way to put your data in chronological order in Excel is by way of pivot tables. A pivot table takes individual records that are in an Excel table (or in an external database) and combines the records in ways that you control. You may have a table showing a year's worth of sales, including the name of the sales rep, the product sold, the date of sale, and the sales revenue. If so, you can very quickly create a pivot table that totals sales revenue by sales rep and by product across quarters. Using pivot tables, you can summarize tens of thousands of records, quite literally within seconds. If you haven't used pivot tables before, this book not only introduces the subject but also makes you dream about them in the middle of the night.

Three particularly wonderful things about pivot tables:

- **They can accumulate for you all your sales data — or, for that matter, your data on the solar wind, but this book is about sales forecasting.** If you gather information on a sale-by-sale basis, and you then want to know how much your reps sold on a given day, in a given week, and so on, a pivot table is the best way to do so.
- **You can use a pivot table as the basis for your next forecast, which saves you a bunch of time.**
- **They have a unique way of helping you group your historical data — by day, by week, by month, by quarter, by year, you name it.** Chapter 8 gives you the details, as well as much more information on pivot tables, including troubleshooting some common problems.

Making Basic Forecasts

Part 3 gets into the business of making actual forecasts, ones that are based on historical data (that is, what's gone on before). You see how to use the Data Analysis add-in to make forecasts that you can back up with actuals — given that you've looked at Part 2 and set up your actuals correctly. (Your *actuals* are the actual sales results that show up in the company's accounting records — say, when the company recognizes the revenue.)

The Data Analysis add-in is a gizmo that has shipped with Excel ever since 1995. It includes a convenient way to make forecasts, as well as to do general data analysis. The three principal tools that the Data Analysis add-in gives you to make forecasts are:

- Moving Averages
- Exponential Smoothing
- Regression

Those are the three principal forecasting methods, and they form the basis for the more-advanced techniques and models. So it's no coincidence that these tools have the same names as the forecasting methods mentioned earlier in this chapter.

TECHNICAL STUFF

The Data Analysis add-in is an *add-in.* An add-in does tasks, like forecasting, on your behalf. An add-in is much like the other tools that are a part of Excel — the difference is that you can choose whether to install an add-in. For example, you can't choose whether the Goal Seek tool (under What-If Analysis on the Ribbon's Data tab) is available to you. If you decide to install Excel on your computer, Goal Seek is just part of the package. Add-ins are different. You can decide whether to install them. When you're installing Excel — and in most cases this means when you're installing Microsoft Office — you get to decide which add-ins you want to use.

The following sections offer a brief introduction to the three Data Analysis tools.

REMEMBER

Given a good baseline, the Data Analysis can turn a forecast back to you. And then you're responsible for evaluating the forecast, for deciding whether it's a credible one, for thinking the forecast over in terms of what you know about your business model. After all, Excel just calculates — you're expected to do the thinking.

Putting moving averages to work for you

You may already be familiar with moving averages. They have two main characteristics, as the name makes clear:

- **They move.** More specifically, they move over time. The first moving average may involve Monday, Tuesday, and Wednesday; in that case, the second moving average would involve Tuesday, Wednesday, and Thursday; the third Wednesday, Thursday, and Friday, and so on.
- **They're averages.** The first moving average may be the average of Monday's, Tuesday's, and Wednesday's sales. Then the second moving average would be the average of Tuesday's, Wednesday's, and Thursday's sales, and so on.

The basic idea, as with all forecasting methods, is that something regular and predictable is going on — often called the *signal.* Sales of ski boots regularly rise during the fall and winter, and predictably fall during the spring and summer. Beer sales regularly rise on NFL Sundays and predictably fall on other days of the week.

But something else is going on, something irregular and unpredictable — often called *noise.* If a local sporting goods store has a sale on, discounting ski boots from May through July, you and your friends may buy new boots during the spring and summer, even though the regular sales pattern (the signal) says that people buy boots during the fall and winter. As a forecaster, you typically can't predict this special sale. It's random and tends to depend on things like overstock. It's noise.

Let's say you run a liquor store, and a Thursday night college football game that looked like it would be the Boring Game of the Week when you were scheduling your purchases in September has suddenly in November turned into one with championship implications. You may be caught short if you scheduled your purchases to arrive at your store the following Saturday, when the signal in the baseline leads you to expect your sales to peak. That's *noise* — the difference between what you predict and what actually happens. By definition, noise is unpredictable, and for a forecaster it's a pain.

If the noise is random, it averages out. Some months, sporting goods stores will be discounting ski boots for less than the cost of an arthroscopy. Some months, a new and really cool model will come out, and the stores will take every possible advantage. The peaks and valleys even out. Some weeks there will be an extra football game or two and you'll sell (and therefore need) more bottles of beer. Some weeks there'll be a dry spell from Monday through Friday, you won't need so much beer, and you won't want to bear the carrying costs of beer you're not going to sell for a while.

TIP

The idea is that the noise averages out, and that what moving averages show you is the signal. To misquote Johnny Mercer, if you accentuate the signal and eliminate the noise, you latch on to a pretty good forecast.

So with moving averages, you take account of the signal — the fact that you sell more ski boots during certain months and fewer during other months, or that you sell more beer on weekends than on weekdays. At the same time you want to let the random noises — also termed *errors* — cancel one another out. You do that by averaging what's already happened in two, three, four, or more previous consecutive time periods. The signal in those time periods is emphasized by the averaging, and that averaging also tends to minimize the noise.

Suppose you decide to base your moving averages on two-month records. That is, you'll average January and February, and then February and March, and then March and April, and so on. In that case you're getting a handle on the signal by averaging two consecutive months and reducing the noise at the same time. Then, if you want to forecast what will happen in May, you hope to be able to use the signal — that is, the average of what's happened in March and April.

Figure 1-2 shows an example of the monthly sales results and of the two-month moving average.

Chapter 14 goes into more detail about using moving averages for forecasting.

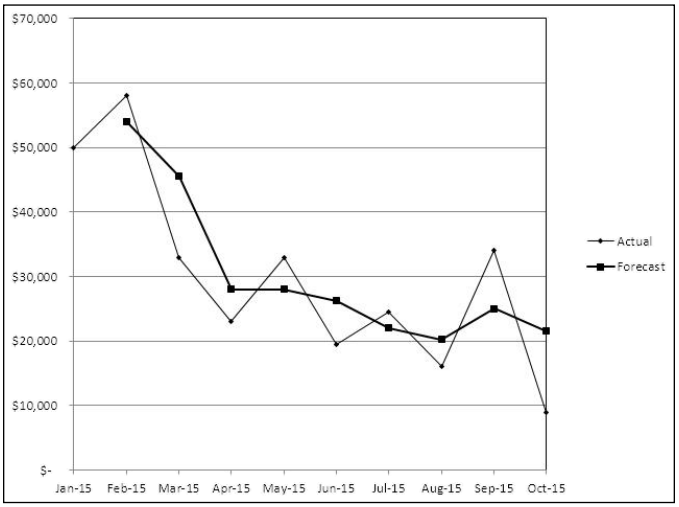

FIGURE 1-2: The moving average shows the general direction of the sales (the signal), and deemphasizes the random variations (the noise).

Making sense of exponential smoothing

I know, the term *exponential smoothing* sounds intimidating and pretentious. I guess it's both — although I promise I'm not responsible for it. (If you really want, you can find out why it's called that in Chapter 15.) In any event, don't worry about what it's called — it's just a kind of self-correcting moving average.

Suppose that in June, you forecast $100,000 in sales for July. When the July sales results are in, you find that your July forecast of $100,000 was $25,000 too low — you actually made $125,000 in sales. Now you need to forecast your sales for August. The idea behind this approach to forecasting is to adjust your August forecast in a way that would have made the *July* forecast more accurate. That is, because your July forecast was too low, you increase your August forecast above what it would have been otherwise.

More generally:

- If your most recent forecast turned out to be an underestimate, you adjust your next forecast upward.
- If your most recent forecast turned out to be an overestimate, you adjust your next forecast downward.

You don't make these adjustments just by guessing. There are formulas that help out, and the Data Analysis add-in's Exponential Smoothing tool can enter the formulas for you. Or you can roll your own formulas if you want. Turn to Chapter 15 to see how to do that.

Figure 1-3 shows what you would forecast if your prior forecast (for July) was too low — then you boost your forecast for August.

And if your prior, July forecast was too high, you cool your jets a little bit in your August forecast, as shown in Figure 1-4.

Using regression to get what you want

The term *regression* doesn't sound as bad as *exponential smoothing*, but it is — I admit — more complicated, at least in terms of the math.

And that's why the Regression tool in the Data Analysis add-in is convenient. The add-in takes responsibility for the math, just as it does with moving averages and exponential smoothing. ***Remember:*** You still have to give a good baseline to the tools in the Data Analysis add-in to get accurate results.