

LEARNING MADE EASY



2nd Edition

Microsoft®  
**Excel® Sales  
Forecasting**

**for  
dummies®**  
A Wiley Brand



Choose, manage,  
and present data

Select the right forecasting  
method for your business

Use moving averages and  
predict seasonal sales

Conrad Carlberg, PhD





# Excel<sup>®</sup> Sales Forecasting

for  
**dummies<sup>®</sup>**

A Wiley Brand

2nd edition

by Conrad Carlberg, Ph.D



for  
**dummies<sup>®</sup>**  
A Wiley Brand



## Excel® Sales Forecasting For Dummies®, 2nd Edition

Published by: John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030-5774, [www.wiley.com](http://www.wiley.com)

Copyright © 2016 by John Wiley & Sons, Inc., Hoboken, New Jersey

Published simultaneously in Canada

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without the prior written permission of the Publisher. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at <http://www.wiley.com/go/permissions>.

**Trademarks:** Wiley, For Dummies, the Dummies Man logo, Dummies.com, Making Everything Easier, and related trade dress are trademarks or registered trademarks of John Wiley & Sons, Inc. and may not be used without written permission. Excel is a registered trademark of Microsoft Corporation. All other trademarks are the property of their respective owners. John Wiley & Sons, Inc. is not associated with any product or vendor mentioned in this book.

**LIMIT OF LIABILITY/DISCLAIMER OF WARRANTY:** THE PUBLISHER AND THE AUTHOR MAKE NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE ACCURACY OR COMPLETENESS OF THE CONTENTS OF THIS WORK AND SPECIFICALLY DISCLAIM ALL WARRANTIES, INCLUDING WITHOUT LIMITATION WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. NO WARRANTY MAY BE CREATED OR EXTENDED BY SALES OR PROMOTIONAL MATERIALS. THE ADVICE AND STRATEGIES CONTAINED HEREIN MAY NOT BE SUITABLE FOR EVERY SITUATION. THIS WORK IS SOLD WITH THE UNDERSTANDING THAT THE PUBLISHER IS NOT ENGAGED IN RENDERING LEGAL, ACCOUNTING, OR OTHER PROFESSIONAL SERVICES. IF PROFESSIONAL ASSISTANCE IS REQUIRED, THE SERVICES OF A COMPETENT PROFESSIONAL PERSON SHOULD BE SOUGHT. NEITHER THE PUBLISHER NOR THE AUTHOR SHALL BE LIABLE FOR DAMAGES ARISING HEREFROM. THE FACT THAT AN ORGANIZATION OR WEBSITE IS REFERRED TO IN THIS WORK AS A CITATION AND/OR A POTENTIAL SOURCE OF FURTHER INFORMATION DOES NOT MEAN THAT THE AUTHOR OR THE PUBLISHER ENDORSES THE INFORMATION THE ORGANIZATION OR WEBSITE MAY PROVIDE OR RECOMMENDATIONS IT MAY MAKE. FURTHER, READERS SHOULD BE AWARE THAT INTERNET WEBSITES LISTED IN THIS WORK MAY HAVE CHANGED OR DISAPPEARED BETWEEN WHEN THIS WORK WAS WRITTEN AND WHEN IT IS READ.

For general information on our other products and services, please contact our Customer Care Department within the U.S. at 877-762-2974, outside the U.S. at 317-572-3993, or fax 317-572-4002. For technical support, please visit <https://hub.wiley.com/community/support/dummies>.

Wiley publishes in a variety of print and electronic formats and by print-on-demand. Some material included with standard print versions of this book may not be included in e-books or in print-on-demand. If this book refers to media such as a CD or DVD that is not included in the version you purchased, you may download this material at <http://booksupport.wiley.com>. For more information about Wiley products, visit [www.wiley.com](http://www.wiley.com).

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

Library of Congress Control Number: 2016942855

ISBN: 978-1-119-29142-8

ISBN 978-1-119-29143-5 (ePub); ISBN 978-1-119-29144-2 (ePDF)

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1



# Contents at a Glance

|                                                                             |     |
|-----------------------------------------------------------------------------|-----|
| <b>Introduction</b> .....                                                   | 1   |
| <b>Part 1: Understanding Sales Forecasting and How Excel Can Help</b> ..... | 5   |
| CHAPTER 1: A Forecasting Overview .....                                     | 7   |
| CHAPTER 2: Forecasting: The Basic Issues .....                              | 23  |
| CHAPTER 3: Understanding Baselines .....                                    | 41  |
| CHAPTER 4: Predicting the Future: Why Forecasting Works .....               | 53  |
| <b>Part 2: Organizing the Data</b> .....                                    | 69  |
| CHAPTER 5: Choosing Your Data: How to Get a Good Baseline .....             | 71  |
| CHAPTER 6: Setting Up Tables in Excel .....                                 | 87  |
| CHAPTER 7: Working with Tables in Excel .....                               | 103 |
| <b>Part 3: Making a Basic Forecast</b> .....                                | 119 |
| CHAPTER 8: Summarizing Sales Data with Pivot Tables .....                   | 121 |
| CHAPTER 9: Charting Your Baseline: It's a Good Idea .....                   | 141 |
| CHAPTER 10: Forecasting with Excel's Data Analysis Add-in .....             | 159 |
| CHAPTER 11: Basing Forecasts on Regression .....                            | 173 |
| <b>Part 4: Making Advanced Forecasts</b> .....                              | 189 |
| CHAPTER 12: Entering the Formulas Yourself .....                            | 191 |
| CHAPTER 13: Using Moving Averages .....                                     | 219 |
| CHAPTER 14: Changing Horses: From Moving Averages to Smoothing .....        | 237 |
| CHAPTER 15: Smoothing: How You Profit from Your Mistakes .....              | 259 |
| CHAPTER 16: Fine-Tuning a Regression Forecast .....                         | 285 |
| CHAPTER 17: Managing Trends .....                                           | 311 |
| CHAPTER 18: Same Time Last Year: Forecasting Seasonal Sales .....           | 329 |
| <b>Part 5: The Part of Tens</b> .....                                       | 349 |
| CHAPTER 19: Ten Fun Facts to Know and Tell about Array Formulas .....       | 351 |
| CHAPTER 20: The Ten Best Excel Tools .....                                  | 363 |
| <b>Index</b> .....                                                          | 373 |



# Table of Contents

|                                                                               |        |
|-------------------------------------------------------------------------------|--------|
| <b>INTRODUCTION</b>                                                           | 1      |
| About This Book                                                               | 1      |
| Foolish Assumptions                                                           | 2      |
| Icons Used in This Book                                                       | 2      |
| Beyond the Book                                                               | 3      |
| Where to Go from Here                                                         | 3      |
| <br><b>PART 1: UNDERSTANDING SALES FORECASTING<br/>AND HOW EXCEL CAN HELP</b> | <br>5  |
| <b>CHAPTER 1: A Forecasting Overview</b>                                      | 7      |
| Understanding Excel Forecasts                                                 | 8      |
| Method #1: Moving averages                                                    | 9      |
| Method #2: Exponential smoothing                                              | 9      |
| Method #3: Regression                                                         | 10     |
| Getting the Data Ready                                                        | 10     |
| Using tables                                                                  | 10     |
| Ordering your data                                                            | 12     |
| Making Basic Forecasts                                                        | 13     |
| Putting moving averages to work for you                                       | 14     |
| Making sense of exponential smoothing                                         | 16     |
| Using regression to get what you want                                         | 16     |
| Charting Your Data                                                            | 19     |
| Forecasting with Advanced Tools                                               | 20     |
| <br><b>CHAPTER 2: Forecasting: The Basic Issues</b>                           | <br>23 |
| Why Forecast?                                                                 | 24     |
| To plan sales strategies                                                      | 24     |
| To size inventories                                                           | 25     |
| Talking the Talk: Basic Forecasting Lingo                                     | 26     |
| Autoregressive integrated moving averages (ARIMA)                             | 26     |
| Baseline                                                                      | 27     |
| Correlation                                                                   | 27     |
| Cycle                                                                         | 28     |
| Damping factor                                                                | 28     |
| Exponential smoothing                                                         | 28     |
| Forecast period                                                               | 28     |
| Moving average                                                                | 29     |
| Predictor variable                                                            | 29     |
| Regression                                                                    | 29     |
| Seasonality                                                                   | 30     |
| Trend                                                                         | 30     |



|                                                                        |           |
|------------------------------------------------------------------------|-----------|
| Understanding the Baseline .....                                       | 30        |
| Charting the baseline .....                                            | 31        |
| Looking for trends .....                                               | 32        |
| Setting Up Your Forecast .....                                         | 33        |
| Smoothing data .....                                                   | 34        |
| Regression: It's all about relationships .....                         | 34        |
| Using Your Revenue and Cost Data .....                                 | 35        |
| <b>CHAPTER 3: Understanding Baselines .....</b>                        | <b>41</b> |
| Using Qualitative Data .....                                           | 42        |
| Asking the right questions .....                                       | 42        |
| Keeping your eye on the ball: The purpose of your forecast .....       | 43        |
| Recovering from Mistakes in Sales Forecasting .....                    | 45        |
| Getting over it .....                                                  | 45        |
| Using revenue targets as forecasts .....                               | 46        |
| Recognizing Trends and Seasons .....                                   | 47        |
| Identifying trends .....                                               | 48        |
| Understanding seasonality .....                                        | 50        |
| <b>CHAPTER 4: Predicting the Future: Why Forecasting Works .....</b>   | <b>53</b> |
| Understanding Trends .....                                             | 54        |
| Watching revenues go up — and down .....                               | 55        |
| Testing for trends .....                                               | 59        |
| Matchmaker, Matchmaker: Finding Relationships in the Data .....        | 63        |
| Choosing the predictors .....                                          | 64        |
| Analyzing the correlations .....                                       | 67        |
| <b>PART 2: ORGANIZING THE DATA .....</b>                               | <b>69</b> |
| <b>CHAPTER 5: Choosing Your Data: How to Get a Good Baseline .....</b> | <b>71</b> |
| Early to Bed: Getting Your Figures in Order .....                      | 72        |
| Why order matters: Moving averages .....                               | 72        |
| Why order matters: Exponential smoothing .....                         | 75        |
| Why order doesn't matter: Regression .....                             | 76        |
| Staying Inside the Lines: Why Time Periods Matter .....                | 77        |
| Deciding how far to forecast .....                                     | 78        |
| Choosing your time periods .....                                       | 81        |
| Spacing Time Periods Equally .....                                     | 82        |
| Using periodic relationships .....                                     | 83        |
| When missing data causes unequal time periods .....                    | 85        |
| <b>CHAPTER 6: Setting Up Tables in Excel .....</b>                     | <b>87</b> |
| Understanding Table Structures .....                                   | 88        |
| Creating a Table .....                                                 | 91        |
| Using the Total row .....                                              | 93        |
| Using other table features .....                                       | 96        |



|                                                                        |            |
|------------------------------------------------------------------------|------------|
| Filtering Lists .....                                                  | 96         |
| Using Excel's table filters .....                                      | 96         |
| Using the Advanced Filter .....                                        | 98         |
| Importing Data from a Database to an Excel Table .....                 | 100        |
| <b>CHAPTER 7: Working with Tables in Excel .....</b>                   | <b>103</b> |
| Turning Tables into Charts .....                                       | 103        |
| Understanding chart types .....                                        | 104        |
| Creating the chart from your table .....                               | 108        |
| Refining charts .....                                                  | 109        |
| Using the Data Analysis Add-in with Tables .....                       | 112        |
| Avoiding the Data Analysis Add-in's Traps .....                        | 115        |
| <b>PART 3: MAKING A BASIC FORECAST .....</b>                           | <b>119</b> |
| <b>CHAPTER 8: Summarizing Sales Data with Pivot Tables .....</b>       | <b>121</b> |
| Understanding Pivot Tables .....                                       | 122        |
| Making baselines out of sales data .....                               | 123        |
| Totaling up the data .....                                             | 128        |
| Building the Pivot Table .....                                         | 130        |
| Grouping Records .....                                                 | 134        |
| Knowing when to group records .....                                    | 135        |
| Creating the groups .....                                              | 135        |
| Avoiding Grief in Excel Pivot Tables .....                             | 137        |
| Don't use blank dates .....                                            | 137        |
| Making multiple groups .....                                           | 138        |
| <b>CHAPTER 9: Charting Your Baseline: It's a Good Idea .....</b>       | <b>141</b> |
| Digging into a Baseline .....                                          | 142        |
| Using date and time data in Excel .....                                | 142        |
| Charting dates and times in Excel .....                                | 143        |
| Using Line charts .....                                                | 146        |
| Using XY (Scatter) charts .....                                        | 151        |
| Making Your Data Dance with Pivot Charts .....                         | 152        |
| Using Two Value Axes .....                                             | 157        |
| <b>CHAPTER 10: Forecasting with Excel's Data Analysis Add-in .....</b> | <b>159</b> |
| Installing Add-ins: Is the Add-in Even There? .....                    | 160        |
| Using Moving Averages .....                                            | 162        |
| Moving day: Getting from here to there .....                           | 163        |
| Moving averages and stationary baselines .....                         | 164        |
| Using Exponential Smoothing .....                                      | 165        |
| Using the Regression Tool .....                                        | 168        |



|                                                          |     |
|----------------------------------------------------------|-----|
| <b>CHAPTER 11: Basing Forecasts on Regression</b>        | 173 |
| Deciding to Use the Regression Tool                      | 174 |
| Adopting the Regression approach                         | 175 |
| Using more than one predictor variable                   | 177 |
| Understanding the Data Analysis Add-in's Regression Tool | 178 |
| Checking the forecast errors                             | 182 |
| Plotting your actual revenues                            | 183 |
| Understanding confidence levels                          | 184 |
| Avoiding a zero constant                                 | 185 |
| Using Multiple Regression                                | 186 |
| New predictor with forecast variable                     | 187 |
| New predictor with existing variable                     | 188 |
| <b>PART 4: MAKING ADVANCED FORECASTS</b>                 | 189 |
| <b>CHAPTER 12: Entering the Formulas Yourself</b>        | 191 |
| About Excel Formulas                                     | 192 |
| Doing it yourself: Why bother?                           | 192 |
| Getting the syntax right                                 | 198 |
| Using Insert Function                                    | 199 |
| Understanding Array Formulas                             | 205 |
| Choosing the range for the array formula                 | 206 |
| Excel's three-finger salute: Ctrl+Shift+Enter            | 207 |
| Recognizing array formulas                               | 208 |
| A special problem with array formulas                    | 209 |
| Using the Regression Functions to Forecast               | 210 |
| Using the LINEST function                                | 210 |
| Selecting the right range of cells                       | 213 |
| Getting the statistics right                             | 213 |
| Using the TREND function                                 | 215 |
| <b>CHAPTER 13: Using Moving Averages</b>                 | 219 |
| Choosing the Length of the Moving Average                | 220 |
| Signaling: Left turn coming up?                          | 220 |
| A little less noise, please                              | 221 |
| Stepping it up                                           | 224 |
| Reacting Quickly versus Modeling Noise                   | 226 |
| Getting a smoother picture                               | 227 |
| Calculating and charting moving averages                 | 228 |
| Using the Data Analysis Add-in to Get Moving Averages    | 229 |
| Using the Data Analysis add-in's Moving Average tool     | 230 |
| Charting residuals                                       | 234 |



|                    |                                                              |            |
|--------------------|--------------------------------------------------------------|------------|
| <b>CHAPTER 14:</b> | <b>Changing Horses: From Moving Averages to Smoothing</b>    | <b>237</b> |
|                    | Losing Early Averages                                        | 238        |
|                    | Understanding Correlation                                    | 240        |
|                    | When did they start going together?                          | 240        |
|                    | Charting correlated data                                     | 243        |
|                    | Understanding Autocorrelation                                | 244        |
|                    | Calculating autocorrelation                                  | 253        |
|                    | Diagnosing autocorrelation                                   | 254        |
| <b>CHAPTER 15:</b> | <b>Smoothing: How You Profit from Your Mistakes</b>          | <b>259</b> |
|                    | Correcting Errors: The Idea Behind Smoothing                 | 260        |
|                    | Adjusting the forecast                                       | 260        |
|                    | Why they call it "exponential smoothing"                     | 263        |
|                    | Fooling around with the smoothing constant                   | 266        |
|                    | Using the Smoothing Tool's Formula                           | 269        |
|                    | Getting a forecast from the Exponential Smoothing tool       | 269        |
|                    | Modifying the smoothing constant                             | 273        |
|                    | Finding the Smoothing Constant                               | 275        |
|                    | Developing the yardstick                                     | 275        |
|                    | Minimizing the square root of the mean square error          | 278        |
|                    | Problems with Exponential Smoothing                          | 282        |
|                    | Losing an observation at the start                           | 282        |
|                    | The Regression tool's standard errors: They're wrong         | 283        |
| <b>CHAPTER 16:</b> | <b>Fine-Tuning a Regression Forecast</b>                     | <b>285</b> |
|                    | Doing Multiple Regression                                    | 286        |
|                    | Using more than one predictor                                | 286        |
|                    | The thinking person's approach to multiple regression        | 292        |
|                    | Interpreting the coefficients and their standard errors      | 296        |
|                    | Getting a Regression Trendline into a Chart                  | 301        |
|                    | Evaluating Regression Forecasts                              | 306        |
|                    | Using autoregression                                         | 306        |
|                    | Regressing one trend onto another                            | 309        |
| <b>CHAPTER 17:</b> | <b>Managing Trends</b>                                       | <b>311</b> |
|                    | Knowing Why You May Want to Remove the Trend from a Baseline | 312        |
|                    | Understanding why trend is a problem                         | 312        |
|                    | Diagnosing a trend                                           | 313        |
|                    | Getting a Baseline to Stand Still                            | 315        |
|                    | Subtracting one value from the next value                    | 316        |
|                    | Dividing one value by another                                | 318        |



|                                                                              |            |
|------------------------------------------------------------------------------|------------|
| Getting rates.....                                                           | 320        |
| The downside of differencing .....                                           | 321        |
| And All the King's Men: Putting a Baseline Together Again.....               | 325        |
| <b>CHAPTER 18: Same Time Last Year: Forecasting</b>                          |            |
| <b>Seasonal Sales.....</b>                                                   | <b>329</b> |
| Doing Simple Seasonal Exponential Smoothing.....                             | 330        |
| Relating a season to its ancestors.....                                      | 330        |
| Using the smoothing constants.....                                           | 334        |
| Getting Farther into the Baseline .....                                      | 338        |
| Calculating the first forecast .....                                         | 338        |
| Smoothing through the baseline level .....                                   | 341        |
| 'Tis the seasonal component.....                                             | 342        |
| Finishing the Forecast.....                                                  | 344        |
| Modifying the formulas .....                                                 | 344        |
| Using the worksheet.....                                                     | 345        |
| Using the workbook .....                                                     | 346        |
| Excel 2016's new Forecast Sheet.....                                         | 348        |
| <b>PART 5: THE PART OF TENS.....</b>                                         | <b>349</b> |
| <b>CHAPTER 19: Ten Fun Facts to Know and Tell about Array Formulas .....</b> | <b>351</b> |
| Entering Array Formulas.....                                                 | 352        |
| Using the Shift Key .....                                                    | 352        |
| Noticing the Curly Brackets .....                                            | 354        |
| Using INDEX to Extract a Value from an Array Formula's Result .....          | 354        |
| A Quick Route to Unique Values .....                                         | 356        |
| Selecting the Range: LINEST.....                                             | 358        |
| Selecting the Range: TRANSPOSE .....                                         | 358        |
| Selecting a Range: TREND .....                                               | 359        |
| Editing an Array Formula .....                                               | 361        |
| Deleting Array Formulas.....                                                 | 362        |
| <b>CHAPTER 20: The Ten Best Excel Tools.....</b>                             | <b>363</b> |
| Cell Comments.....                                                           | 363        |
| AutoComplete .....                                                           | 364        |
| Macro Security.....                                                          | 365        |
| The Customizable Toolbar.....                                                | 366        |
| Evaluate Formula.....                                                        | 367        |
| Worksheet Protection.....                                                    | 368        |
| Unique Records Only .....                                                    | 369        |
| Using the Fill Handle.....                                                   | 369        |
| Quick Data Summaries.....                                                    | 370        |
| Help with Functions.....                                                     | 370        |
| <b>INDEX .....</b>                                                           | <b>373</b> |