

## NOTES + COMMENTS

1. Tables have been used to display data for more than a thousand years. However, charts are much more recent inventions. The famous seventeenth-century French mathematician, René Descartes, is credited with inventing the now familiar graph with horizontal and vertical axes. William Playfair invented bar charts, line charts, and pie charts in the late 18th century, all of which we will discuss in this chapter. More recently, individuals such as William Cleveland, Edward R. Tufte, and Stephen Few have introduced design techniques for both clarity and beauty in data visualization.
2. Many of the default settings in Excel are not ideal for displaying data using tables and charts that communicate effectively. Before presenting Excel-generated tables and charts to others, it is worth the effort to remove unnecessary lines and labels.

## 3.2 Tables

The first decision in displaying data is whether a table or a chart will be more effective. In general, charts can often convey information faster and easier to readers, but in some cases a table is more appropriate. Tables should be used when:

1. The reader needs to refer to specific numerical values.
2. The reader needs to make precise comparisons between different values and not just relative comparisons.
3. The values being displayed have different units or very different magnitudes.

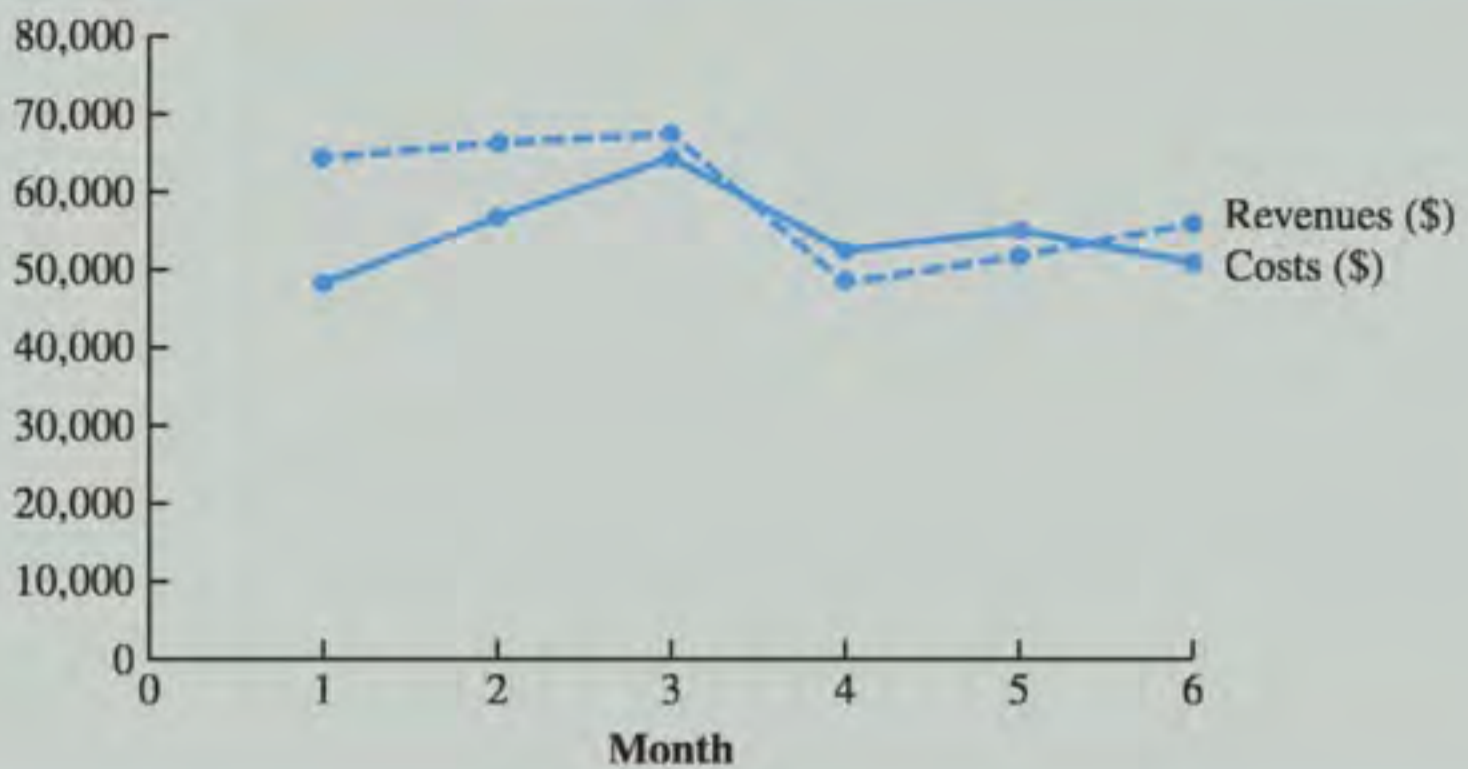
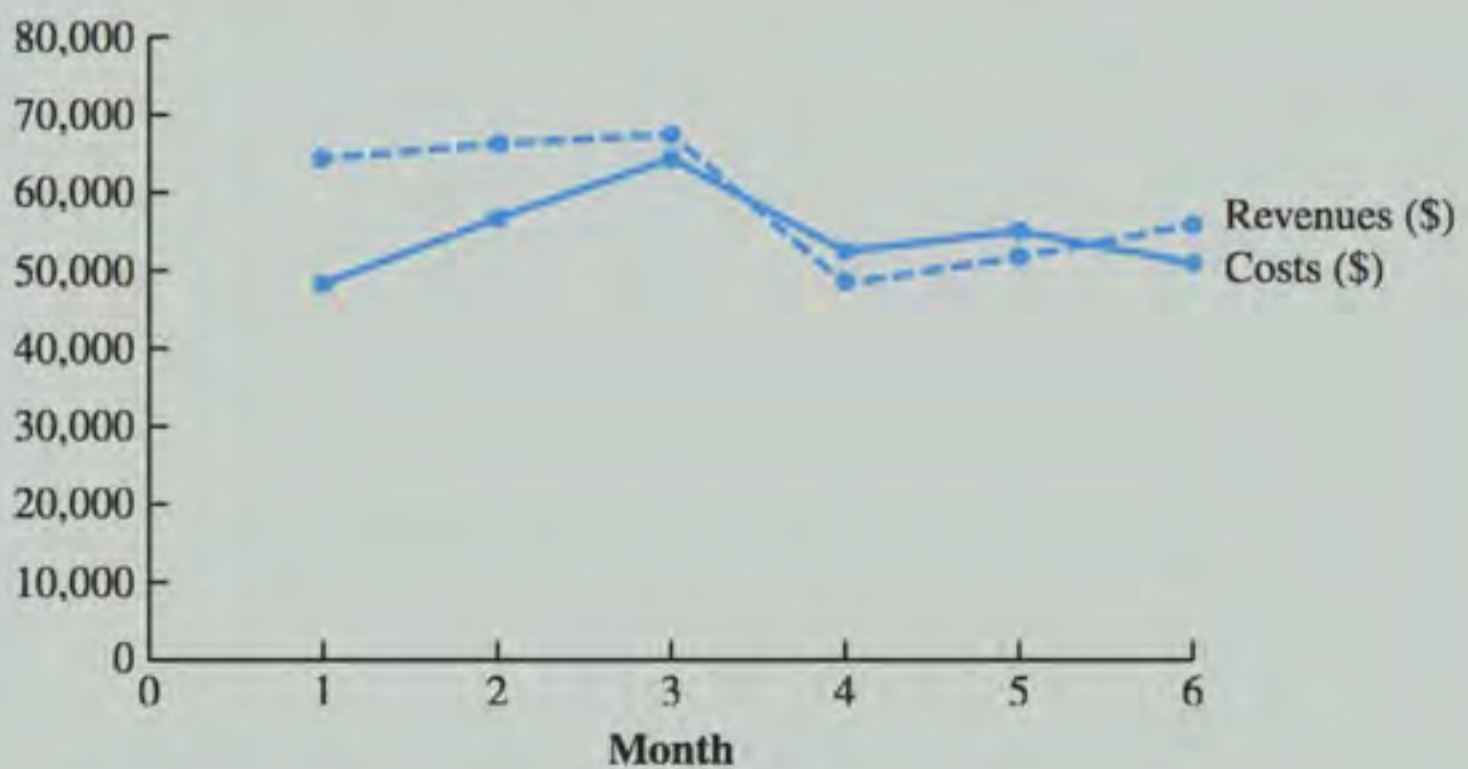
When the accounting department of Gossamer Industries is summarizing the company's annual data for completion of its federal tax forms, the specific numbers corresponding to revenues and expenses are important and not just the relative values. Therefore, these data should be presented in a table similar to Table 3.3.

Similarly, if it is important to know by exactly how much revenues exceed expenses each month, then this would also be better presented as a table rather than as a line chart, as seen in Figure 3.5. Notice that it is very difficult to determine the monthly revenues and costs in Figure 3.5. We could add these values using data labels, but they would clutter the figure. The preferred solution is to combine the chart with the table into a single figure, as in Figure 3.6, to allow the reader to easily see the monthly changes in revenues and costs while also being able to refer to the exact numerical values.

Now suppose that you wish to display data on revenues, costs, and head count for each month. Costs and revenues are measured in dollars, but head count is measured in number of employees. Although all these values can be displayed on a line chart using multiple vertical axes, this is generally not recommended. Because the values have widely different

**TABLE 3.3** Table Showing Exact Values for Costs and Revenues by Month for Gossamer Industries

	Month						Total
	1	2	3	4	5	6	
Costs (\$)	48,123	56,458	64,125	52,158	54,718	50,985	326,567
Revenues (\$)	64,124	66,128	67,125	48,178	51,785	55,687	353,027

**FIGURE 3.5****Line Chart of Monthly Costs and Revenues at Gossamer Industries****FIGURE 3.6****Combined Line Chart and Table for Monthly Costs and Revenues at Gossamer Industries**

	Month						Total
	1	2	3	4	5	6	
<b>Costs (\$)</b>	48,123	56,458	64,125	52,158	54,718	50,985	326,567
<b>Revenues (\$)</b>	64,124	66,128	67,125	48,178	51,785	55,687	353,027

**TABLE 3.4** Table Displaying Head Count, Costs, and Revenues at Gossamer Industries

	Month						Total
	1	2	3	4	5	6	
Head count	8	9	10	9	9	9	
Costs (\$)	48,123	56,458	64,125	52,158	54,718	50,985	326,567
Revenues (\$)	64,124	66,128	67,125	48,178	51,785	55,687	353,027

magnitudes (costs and revenues are in the tens of thousands, whereas head count is approximately 10 each month), it would be difficult to interpret changes on a single chart. Therefore, a table similar to Table 3.4 is recommended.

### Table Design Principles

In designing an effective table, keep in mind the data-ink ratio and avoid the use of unnecessary ink in tables. In general, this means that we should avoid using vertical lines in a table unless they are necessary for clarity. Horizontal lines are generally necessary only for separating column titles from data values or when indicating that a calculation has taken place. Consider Figure 3.7, which compares several forms of a table displaying Gossamer's costs and revenue data. Most people find Design D, with the fewest grid lines, easiest to read. In this table, grid lines are used only to separate the column headings from the data and to indicate that a calculation has occurred to generate the Profits row and the Total column.

In large tables, vertical lines or light shading can be useful to help the reader differentiate the columns and rows. Table 3.5 breaks out the revenue data by location for nine cities and shows 12 months of revenue and cost data. In Table 3.5, every other column has been lightly shaded. This helps the reader quickly scan the table to see which values correspond with each month. The horizontal line between the revenue for Academy and the

**FIGURE 3.7** Comparing Different Table Designs

Design A:

	Month						Total
	1	2	3	4	5	6	
Costs (\$)	48,123	56,458	64,125	52,158	54,718	50,985	326,567
Revenues (\$)	64,124	66,128	67,125	48,178	51,785	55,687	353,027
Profits (\$)	16,001	9,670	3,000	(3,980)	(2,933)	4,702	26,460

Design B:

	Month						Total
	1	2	3	4	5	6	
Costs (\$)	48,123	56,458	64,125	52,158	54,718	50,985	326,567
Revenues (\$)	64,124	66,128	67,125	48,178	51,785	55,687	353,027
Profits (\$)	16,001	9,670	3,000	(3,980)	(2,933)	4,702	26,460

Design C:

	Month						Total
	1	2	3	4	5	6	
Costs (\$)	48,123	56,458	64,125	52,158	54,718	50,985	326,567
Revenues (\$)	64,124	66,128	67,125	48,178	51,785	55,687	353,027
Profits (\$)	16,001	9,670	3,000	(3,980)	(2,933)	4,702	26,460

Design D:

	Month						Total
	1	2	3	4	5	6	
Costs (\$)	48,123	56,458	64,125	52,158	54,718	50,985	326,567
Revenues (\$)	64,124	66,128	67,125	48,178	51,785	55,687	353,027
Profits (\$)	16,001	9,670	3,000	(3,980)	(2,933)	4,702	26,460

**TABLE 3.5** Larger Table Showing Revenues by Location for 12 Months of Data

Revenues by Location (\$)	Month												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Temple	8,987	8,595	8,958	6,718	8,066	8,574	8,701	9,490	9,610	9,262	9,875	11,058	107,895
Killeen	8,212	9,143	8,714	6,869	8,150	8,891	8,766	9,193	9,603	10,374	10,456	10,982	109,353
Waco	11,603	12,063	11,173	9,622	8,912	9,553	11,943	12,947	12,925	14,050	14,300	13,877	142,967
Belton	7,671	7,617	7,896	6,899	7,877	6,621	7,765	7,720	7,824	7,938	7,943	7,047	90,819
Granger	7,642	7,744	7,836	5,833	6,002	6,728	7,848	7,717	7,646	7,620	7,728	8,013	88,357
Harker Heights	5,257	5,326	4,998	4,304	4,106	4,980	5,084	5,061	5,186	5,179	4,955	5,326	59,763
Gatesville	5,316	5,245	5,056	3,317	3,852	4,026	5,135	5,132	5,052	5,271	5,304	5,154	57,859
Lampasas	5,266	5,129	5,022	3,022	3,088	4,289	5,110	5,073	4,978	5,343	4,984	5,315	56,620
Academy	4,170	5,266	7,472	1,594	1,732	2,025	8,772	1,956	3,304	3,090	3,579	2,487	45,446
<b>Total</b>	<b>64,124</b>	<b>66,128</b>	<b>67,125</b>	<b>48,178</b>	<b>51,785</b>	<b>55,687</b>	<b>69,125</b>	<b>64,288</b>	<b>66,128</b>	<b>68,128</b>	<b>69,125</b>	<b>69,258</b>	<b>759,079</b>
<b>Costs (\$)</b>	<b>48,123</b>	<b>56,458</b>	<b>64,125</b>	<b>52,158</b>	<b>54,718</b>	<b>50,985</b>	<b>57,898</b>	<b>62,050</b>	<b>65,215</b>	<b>61,819</b>	<b>67,828</b>	<b>69,558</b>	<b>710,935</b>

Total row helps the reader differentiate the revenue data for each location and indicates that a calculation has taken place to generate the totals by month. If one wanted to highlight the differences among locations, the shading could be done for every other row instead of every other column.

*We depart from these guidelines in some figures and tables in this textbook to more closely match Excel's output.*

Notice also the alignment of the text and numbers in Table 3.5. Columns of numerical values in a table should be right-aligned; that is, the final digit of each number should be aligned in the column. This makes it easy to see differences in the magnitude of values. If you are showing digits to the right of the decimal point, all values should include the same number of digits to the right of the decimal. Also, use only the number of digits that are necessary to convey the meaning in comparing the values; there is no need to include additional digits if they are not meaningful for comparisons. In many business applications, we report financial values, in which case we often round to the nearest dollar or include two digits to the right of the decimal if such precision is necessary. Additional digits to the right of the decimal are usually unnecessary. For extremely large numbers, we may prefer to display data rounded to the nearest thousand, ten thousand, or even million. For instance, if we need to include, say, \$3,457,982 and \$10,124,390 in a table when exact dollar values are not necessary, we could write these as 3,458 and 10,124 and indicate that all values in the table are in units of \$1,000.

It is generally best to left-align text values within a column in a table, as in the Revenues by Location (the first) column of Table 3.5. In some cases, you may prefer to center text, but you should do this only if the text values are all approximately the same length. Otherwise, aligning the first letter of each data entry promotes readability. Column headings should either match the alignment of the data in the columns or be centered over the values, as in Table 3.5.

## Crosstabulation

*Types of data such as categorical and quantitative are discussed in Chapter 2.*

A useful type of table for describing data of two variables is a **crosstabulation**, which provides a tabular summary of data for two variables. To illustrate, consider the following application based on data from Zagat's Restaurant Review. Data on the quality rating, meal price, and the usual wait time for a table during peak hours were collected for a sample of 300 Los Angeles area restaurants. Table 3.6 shows the data for the first 10 restaurants. Quality ratings are an example of categorical data, and meal prices are an example of quantitative data.

Restaurant	Quality Rating	Meal Price (\$)	Wait Time (min)
1	Good	18	5
2	Very Good	22	6
3	Good	28	1
4	Excellent	38	74
5	Very Good	33	6
6	Good	28	5
7	Very Good	19	11
8	Very Good	11	9
9	Very Good	23	13
10	Good	13	1

**DATA** *file*  
Restaurant

**TABLE 3.7** Crosstabulation of Quality Rating and Meal Price for 300 Los Angeles Restaurants

Quality Rating	Meal Price				Total
	\$10–19	\$20–29	\$30–39	\$40–49	
Good	42	40	2	0	84
Very Good	34	64	46	6	150
Excellent	2	14	28	22	66
Total	78	118	76	28	300

For now, we will limit our consideration to the quality-rating and meal-price variables. A crosstabulation of the data for quality rating and meal price is shown in Table 3.7. The left and top margin labels define the classes for the two variables. In the left margin, the row labels (Good, Very Good, and Excellent) correspond to the three classes of the quality-rating variable. In the top margin, the column labels (\$10–19, \$20–29, \$30–39, and \$40–49) correspond to the four classes (or bins) of the meal-price variable. Each restaurant in the sample provides a quality rating and a meal price. Thus, each restaurant in the sample is associated with a cell appearing in one of the rows and one of the columns of the crosstabulation. For example, restaurant 5 is identified as having a very good quality rating and a meal price of \$33. This restaurant belongs to the cell in row 2 and column 3. In constructing a crosstabulation, we simply count the number of restaurants that belong to each of the cells in the crosstabulation.

Table 3.7 shows that the greatest number of restaurants in the sample (64) have a very good rating and a meal price in the \$20–29 range. Only two restaurants have an excellent rating and a meal price in the \$10–19 range. Similar interpretations of the other frequencies can be made. In addition, note that the right and bottom margins of the crosstabulation give the frequencies of quality rating and meal price separately. From the right margin, we see that data on quality ratings show 84 good restaurants, 150 very good restaurants, and 66 excellent restaurants. Similarly, the bottom margin shows the counts for the meal price variable. The value of 300 in the bottom right corner of the table indicates that 300 restaurants were included in this data set.

## PivotTables in Excel

A crosstabulation in Microsoft Excel is known as a **PivotTable**. We will first look at a simple example of how Excel's PivotTable is used to create a crosstabulation of the Zagat's restaurant data shown previously. Figure 3.8 illustrates a portion of the data contained in the file *Restaurant*; the data for the 300 restaurants in the sample have been entered into cells B2:D301.

To create a PivotTable in Excel, we follow these steps:

**Step 1.** Click the **Insert** tab on the Ribbon

**Step 2.** Click **PivotTable** in the **Tables** group

**Step 3.** When the **Create PivotTable** dialog box appears:

Choose **Select a Table or Range**

Enter *A1:D301* in the **Table/Range:** box

Select **New Worksheet** as the location for the PivotTable Report

Click **OK**

**FIGURE 3.8** Excel Worksheet Containing Restaurant Data

	A	B	C	D
1	Restaurant	Quality Rating	Meal Price (\$)	Wait Time (min)
2	1	Good	18	5
3	2	Very Good	22	6
4	3	Good	28	1
5	4	Excellent	38	74
6	5	Very Good	33	6
7	6	Good	28	5
8	7	Very Good	19	11
9	8	Very Good	11	9
10	9	Very Good	23	13
11	10	Good	13	1
12	11	Very Good	33	18
13	12	Very Good	44	7
14	13	Excellent	42	18
15	14	Excellent	34	46
16	15	Good	25	0
17	16	Good	22	3
18	17	Good	26	3
19	18	Excellent	17	36
20	19	Very Good	30	7
21	20	Good	19	3
22	21	Very Good	33	10
23	22	Very Good	22	14
24	23	Excellent	32	27
25	24	Excellent	33	80
26	25	Very Good	34	9

DATA **file**  
Restaurant

The resulting initial PivotTable Field List and PivotTable Report are shown in Figure 3.9.

Each of the four columns in Figure 3.8 [Restaurant, Quality Rating, Meal Price (\$), and Wait Time (min)] is considered a field by Excel. Fields may be chosen to represent rows, columns, or values in the body of the PivotTable Report. The following steps show how to use Excel's PivotTable Field List to assign the Quality Rating field to the rows, the Meal Price (\$) field to the columns, and the Restaurant field to the body of the PivotTable report.

**Step 4.** In the **PivotTable Fields** task pane, go to **Drag fields between areas below**:

Drag the **Quality Rating** field to the **ROWS** area

Drag the **Meal Price (\$)** field to the **COLUMNS** area

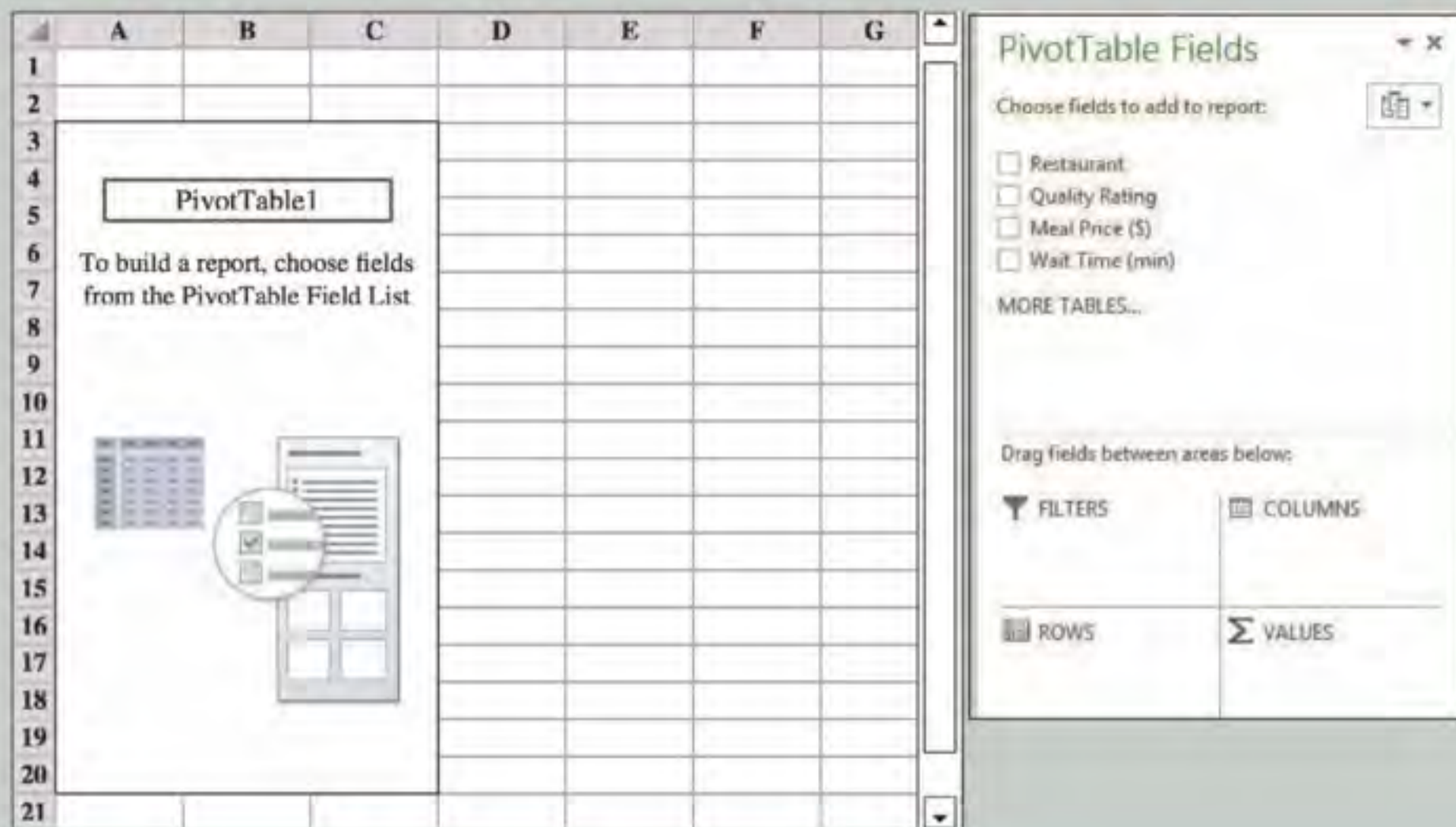
Drag the **Restaurant** field to the **VALUES** area

**Step 5.** Click on **Sum of Restaurant** in the **VALUES** area

**Step 6.** Select **Value Field Settings** from the list of options

FIGURE 3.9

Initial PivotTable Field List and PivotTable Field Report for the Restaurant Data



- Step 7.** When the **Value Field Settings** dialog box appears:  
 Under **Summarize value field by**, select **Count**  
 Click **OK**

Figure 3.10 shows the completed PivotTable Field List and a portion of the PivotTable worksheet as it now appears.

To complete the PivotTable, we need to group the columns representing meal prices and place the row labels for quality rating in the proper order:

- Step 8.** Right-click in cell B4 or any cell containing a meal price column label  
**Step 9.** Select **Group** from the list of options  
**Step 10.** When the **Grouping** dialog box appears:  
 Enter *10* in the **Starting at:** box  
 Enter *49* in the **Ending at:** box  
 Enter *10* in the **By:** box  
 Click **OK**  
**Step 11.** Right-click on "Excellent" in cell A5  
**Step 12.** Select **Move** and click **Move "Excellent" to End**

The final PivotTable, shown in Figure 3.11, provides the same information as the crosstabulation in Table 3.7.

The values in Figure 3.11 can be interpreted as the frequencies of the data. For instance, row 8 provides the frequency distribution for the data over the quantitative variable of meal price. Seventy-eight restaurants have meal prices of \$10 to \$19. Column F provides the frequency distribution for the data over the categorical variable of quality. A total of



FIGURE 3.10

Completed PivotTable Field List and a Portion of the PivotTable Report for the Restaurant Data (Columns H:AK Are Hidden)

	A	B	C	D	E	F	G	AL	AM	AN	AO	AP	AQ	AR
1														
2														
3		Count of Restaurant	Columns Labels											
4		Row Labels	10	11	12	13	14	15	47	48	Grand	Total		
5		Excellent			1		2	2			66			
6		Good	6	4	3	3	2	4			84			
7		Very Good	1	4	3	5	6	1	1		150			
8		Grand Total	7	8	6	9	8	5	2	3	300			
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														

Choose fields to add to report:	
<input checked="" type="checkbox"/>	Restaurant
<input checked="" type="checkbox"/>	Quality Rating
<input checked="" type="checkbox"/>	Meal Price (\$)
<input type="checkbox"/>	Wait Time (min)
MORE TABLES...	
Drag fields between areas below:	
<b>FILTERS</b>	<b>COLUMNS</b>
	Meal Price (\$)
<b>ROWS</b>	<b>VALUES</b>
Quality Rating	Count of Restaur...

150 restaurants have a quality rating of Very Good. We can also use a PivotTable to create percent frequency distributions, as shown in the following steps:

- Step 1.** To invoke the **PivotTable Fields** task pane, select any cell in the pivot table
- Step 2.** In the **PivotTable Fields** task pane, click the **Count of Restaurant** in the **VALUES** area
- Step 3.** Select **Value Field Settings...** from the list of options
- Step 4.** When the **Value Field Settings** dialog box appears, click the tab for **Show Values As**
- Step 5.** In the **Show values as** area, select **% of Grand Total** from the drop-down menu  
Click **OK**

Figure 3.12 displays the percent frequency distribution for the Restaurant data as a PivotTable. The figure indicates that 50% of the restaurants are in the Very Good quality category and that 26% have meal prices between \$10 and \$19.

PivotTables in Excel are interactive, and they may be used to display statistics other than a simple count of items. As an illustration, we can easily modify the PivotTable in Figure 3.11 to display summary information on wait times instead of meal prices.

- Step 1.** To invoke the **PivotTable Fields** task pane, select any cell in the pivot table
- Step 2.** In the **PivotTable Fields** task pane, click the **Count of Restaurant** field in the **VALUES** area  
Select **Remove Field**
- Step 3.** Drag the **Wait Time (min)** to the **VALUES** area
- Step 4.** Click on **Sum of Wait Time (min)** in the **VALUES** area
- Step 5.** Select **Value Field Settings...** from the list of options

**FIGURE 3.11** Final PivotTable Report for the Restaurant Data

	A	B	C	D	E	F	G	H	I
1									
2									
3	<b>Count of Restaurant</b>	<b>Column Labels</b>							
4	<b>Row Labels</b>	<b>10-19</b>	<b>20-29</b>	<b>30-39</b>	<b>40-49</b>	<b>Grand Total</b>			
5	Good	42	40	2		84			
6	Very Good	34	64	46	6	150			
7	Excellent	2	14	28	22	66			
8	<b>Grand Total</b>	<b>78</b>	<b>118</b>	<b>76</b>	<b>28</b>	<b>300</b>			
9									
10									
11									
12									
13									
16									
15									
16									
17									
18									
19									
20									
21									

**PivotTable Fields**

Choose fields to add to report:

- Restaurant
- Quality Rating
- Meal Price (\$)
- Wait Time (min)

MORE TABLES...

Drag fields between areas below:

**FILTERS**

**COLUMNS**  
Meal Price (\$)

**ROWS**  
Quality Rating

**VALUES**  
Count of Restaur...

**FIGURE 3.12** Percent Frequency Distribution as a PivotTable for the Restaurant Data

	A	B	C	D	E	F	G
1							
2							
3	<b>Count of Restaurant</b>	<b>Column</b>					
4	<b>Row Labels</b>	<b>Labels 10-19</b>	<b>20-29</b>	<b>30-39</b>	<b>40-49</b>	<b>Grand Total</b>	
5	Good	14.00%	13.33%	0.67%	0.00%	28.00%	
6	Very Good	11.33%	21.33%	15.33%	2.00%	50.00%	
7	Excellent	0.67%	4.67%	9.33%	7.33%	22.00%	
8	<b>Grand Total</b>	<b>26.00%</b>	<b>39.33%</b>	<b>25.33%</b>	<b>9.33%</b>	<b>100.00%</b>	
9							
10							
11							
12							
13							
16							
15							
16							
17							
18							

**PivotTable Fields**

Choose fields to add to report:

- Restaurant
- Quality Rating
- Meal Price (\$)
- Wait Time (min)

MORE TABLES...

Drag fields between areas below:

**FILTERS**

**COLUMNS**  
Meal Price (\$)

**ROWS**  
Quality Rating

**VALUES**  
Count of Restaurant

**Step 6.** When the **Value Field Settings** dialog box appears:

Under **Summarize value field by**, select **Average**

Click **Number Format**


In the **Category:** area, select **Number**

Enter **1** for **Decimal places:**

Click **OK**

When the **Value Field Settings** dialog box reappears, click **OK**

The completed PivotTable appears in Figure 3.13. This PivotTable replaces the counts of restaurants with values for the average wait time for a table at a restaurant for each grouping of meal prices (\$10–19, \$20–29, \$30–39, \$40–49). For instance, cell B7 indicates that the average wait time for a table at an Excellent restaurant with a meal price of \$10–\$19 is 25.5 minutes. Column F displays the total average wait times for tables in each quality rating category. We see that Excellent restaurants have the longest average waits of 35.2 minutes and that Good restaurants have average wait times of only 2.5 minutes. Finally, cell D7 shows us that the longest wait times can be expected at Excellent restaurants with meal prices in the \$30–\$39 range (34 minutes).

We can also examine only a portion of the data in a PivotTable using the Filter option in Excel. To Filter data in a PivotTable, click on the **Filter Arrow**  next to **Row Labels** or **Column Labels** and then uncheck the values that you want to remove from the PivotTable. For example, we could click on the arrow next to Row Labels and then uncheck the Good value to examine only Very Good and Excellent restaurants.

## Recommended PivotTables in Excel

Excel also has the ability to recommend PivotTables for your data set. To illustrate Recommended PivotTables in Excel, we return to the restaurant data in Figure 3.8.

To create a Recommended PivotTable, follow the steps below using the file *Restaurant*.

You can also filter data in a PivotTable by dragging the field that you want to filter to the **FILTERS** area in the **PivotTable Fields**

**FIGURE 3.13** PivotTable Report for the Restaurant Data with Average Wait Times Added

	A	B	C	D	E	F	G
1							
2							
3	Average of Wait Time (min) Column						
4	Row Labels	Labels 10–19	20–29	30–39	40–49	Grand Total	
5	Good	2.6	2.5	0.5		2.5	
6	Very Good	12.6	12.6	12.0	10.0	12.3	
7	Excellent	25.5	29.1	34.0	32.3	32.1	
8	Grand Total	7.6	11.1	19.8	27.5	13.9	
9							
10							
11							
12							
13							
16							
15							
16							
17							

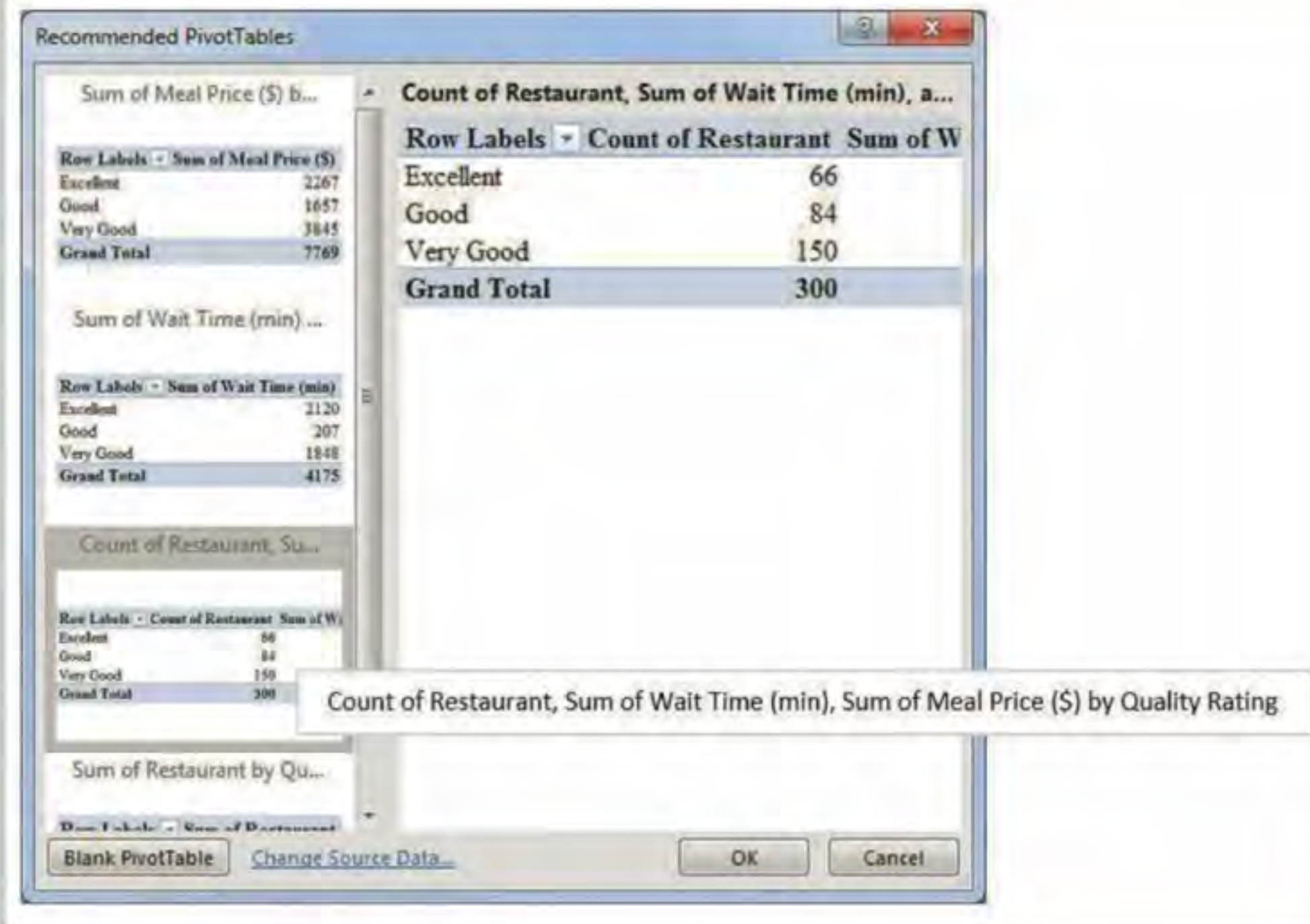
**PivotTable Fields**

Choose fields to add to report:

- Restaurant
- Quality Rating
- Meal Price (\$)
- Wait Time (min)

Drag fields between areas below:

<p><b>FILTERS</b></p>	<p><b>COLUMNS</b></p> <p>Meal Price (\$)</p>
<p><b>ROWS</b></p> <p>Quality Rating</p>	<p><b>VALUES</b></p> <p>Average of Wait Time (min)</p>

**FIGURE 3.14** Recommended PivotTables Dialog Box in Excel

Hovering your pointer over the different options will display the full name of each option, as shown in Figure 3.14.

**Step 1.** Select any cell in table of data (for example, cell A1)

**Step 2.** Click the **Insert** tab on the Ribbon

**Step 3.** Click **Recommended PivotTables** in the **Tables** group

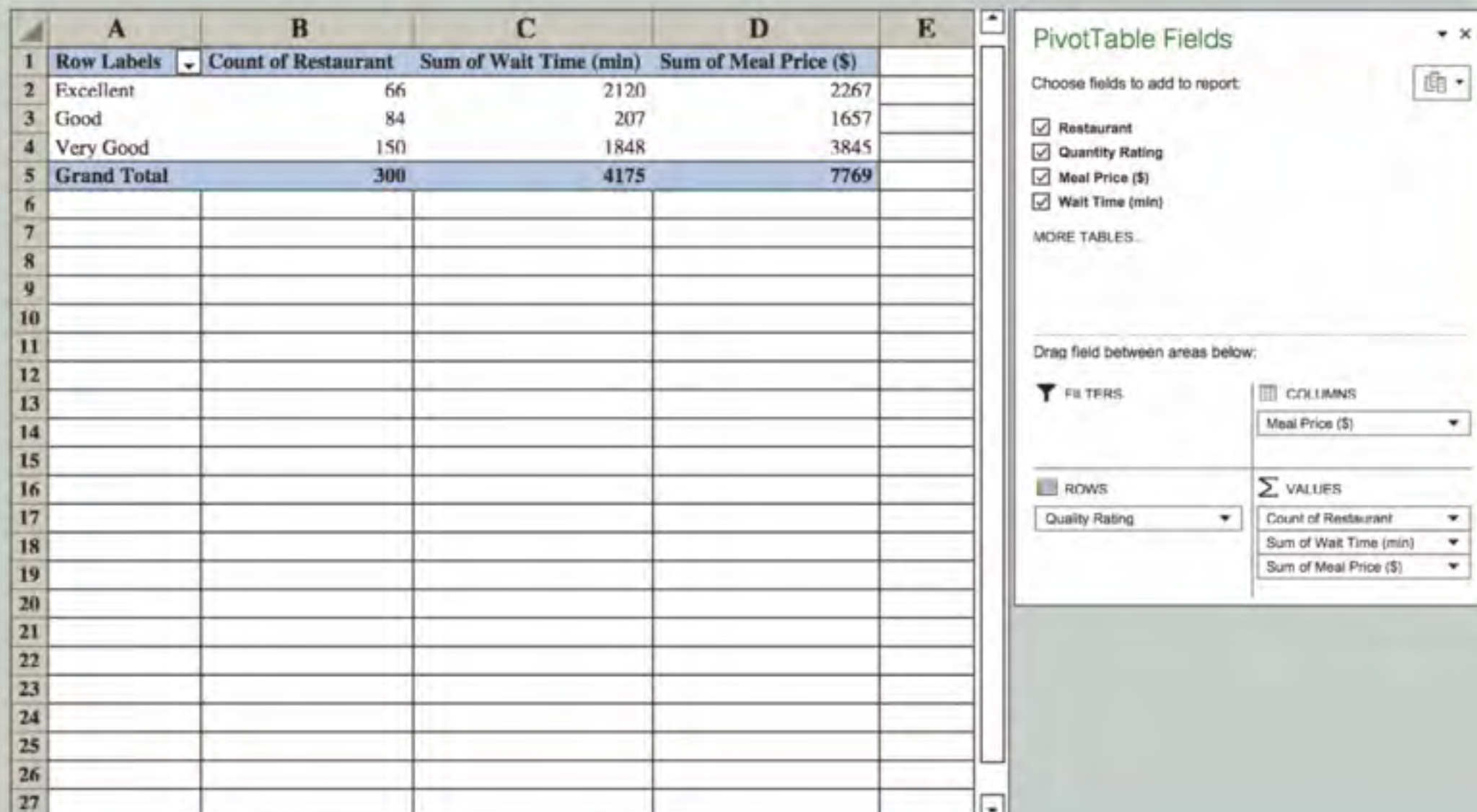
**Step 4.** When the **Recommended PivotTables** dialog box appears:

Select the **Count of Restaurant, Sum of Wait Time (min), Sum of Meal Price (\$) by Quality Rating** option (see Figure 3.14)

Click **OK**

The steps above will create the PivotTable shown in Figure 3.15 on a new Worksheet. The Recommended PivotTables tool in Excel is useful for quickly creating commonly used PivotTables for a data set, but note that it may not give you the option to create the exact PivotTable that will be of the most use for your data analysis. Displaying the sum of wait times and the sum of meal prices within each quality rating category, as shown in Figure 3.15, is not particularly useful here; the average wait times and average meal prices within each quality-rating category would be more useful to us. But we can easily modify the PivotTable in Figure 3.14 to show the average values by selecting any cell in the PivotTable to invoke the **PivotTable Fields** task pane, clicking on **Sum of Wait Time (min)** and then **Sum of Meal Price (\$)**, and using the **Value Field Settings...** to change the **Summarize value field by** option to **Average**. The finished PivotTable is shown in Figure 3.16.

**FIGURE 3.15** Default PivotTable Created for Restaurant Data Using Excel's Recommended PivotTables Tool



**FIGURE 3.16** Completed PivotTable for Restaurant Data Using Excel's Recommended PivotTables Tool

