

F I F T H E D I T I O N

BUSINESS ANALYSIS:

with **Microsoft Excel®**



Business Analysis with Microsoft Excel

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1 Working with Income Statements

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In many ways, operating a business is like playing a game—a serious one, of course—and keeping track of your business is similar to studying games such as baseball. Serious baseball fans know hundreds of statistics, such as batting averages and strikeouts. Similarly, if you are serious about your business, you need to be able to measure and understand the numbers that describe how your company operates. Accounting in general and financial statements in particular provide the scorecards.

This chapter is no treatise on accounting and finance, but it does describe tools that you can use to better understand the financial aspects of operating your business. Plenty of textbooks cover the generally accepted procedures of accounting and finance. This chapter highlights and demonstrates some practical techniques used in those procedures.

KEEPING SCORE

Accounting translates the actions that take place in the business world into a set of numbers that you can use to make informed decisions. Accounting captures information on how well a company operates, the many obstacles that it needs to overcome, and its prospects for the future.

Accounting rules enable you to compare your company with other companies and other industries and to make year-to-year comparisons for your own company. For example, it's against the rules to change your method of depreciation without full disclosure of the effects of the change on the company's financial statements. Depreciation amounts affect a company's reported profit; if you could change your depreciation method whenever you felt like it, you could change your reported profit when it was expedient to do so. Then it would be impossible for those who might invest in your business or who might loan it money to have confidence in the validity of your financials. Having rules and following them makes it possible to conduct business. As we saw during the early 2000s, failing to follow the rules helped to trigger the Great Recession.

It's important to be able to make comparisons with other companies when you want to seek additional funds for expansion, such as by borrowing or by inviting capital investment. Following the rules can open opportunities to succeed and to receive equal treatment in a rugged marketplace. But you don't need to be a CPA to use accounting for solid decision making. It can be as simple as subtracting your expenses from your revenues to determine your profits.

Accounting quantifies the everyday world of buying and selling. Would you buy something for more than you could sell it? Of course not—but many companies do exactly that every year. The collapse of an energy trading giant, of many of the dot-com startups, and of the telecommunications and investment banking conglomerates can be traced to that very mistake. Too often, businesses look at only the up-front costs and ignore the ongoing operation and maintenance costs. It's trite to say so, but things get trite by being true: The devil is in the details, but finance and accounting can help you maintain control.

Choosing the Right Perspective

We all tend to think of accounting as an exact science that is fully governed by rational rules, but the numbers generated are actually only best estimates. Although the rules, procedures, and methods make the numbers appear to be objective facts, they are far from absolute.

The numbers represent how well the managers are running the business. Balance sheets and income statements are not commandments; they are guides, and different users have different purposes for them.

Defining Two Purposes for Accounting

This book (along with just about any book that discusses it at all) classifies accounting

according to who's using the information:

- Management accounting provides information to decision makers inside the company. If you want to bring a new product to market, you assess the product's potential by analyzing cost, price, market demand, and competition. You make judgments about the product—whether to introduce it, how to manage it, whether it has run its course—on the basis of the financial and operational data you have available.
- Financial accounting provides financial information to the company's decision makers, as well as to those outside the company, such as investors, creditors, and governments. Suppose that you wanted to raise funds by making your company a public corporation and issuing shares of stock to the investment community. Potential investors would require detailed financial accounting information (and the law would require you to make it available). An investor wants to know that a set of accepted standards was used to create the information. Otherwise, there is no way for that investor to make an informed choice.

When you decide whether to introduce a new product or make any other management decision, you use a more flexible analytic framework than when you are trying to raise capital in the investment community. You often need room to maneuver, and management accounting provides you with that room.

For example, you might want to use the last-in, first-out (LIFO) method of valuing inventory if your objective is to set sales policies. The LIFO method is the best way to measure net income, taking current prices and costs into account. But the FIFO (first-in, first-out) method provides a better estimate of assets on the balance sheet. So, management accounting allows you the flexibility of choosing your method of valuation, depending on the purpose you have in mind.

► For more information about valuing inventory, see [Chapter 3, “Valuing Inventories for the Balance Sheet.”](#)

Both aspects of accounting are necessary tools, and this book discusses financial accounting from time to time. However, the principal focus is on making information as useful as possible for internal decision making: that is, management accounting.

To use accounting information for routine decision making, you don't need to explore in depth the nuances and technicalities of the accounting profession. But if you understand this information well enough to use it on a routine basis, you will be much better prepared to use your accountant's time wisely when a delicate decision is required.

USING THE INCOME STATEMENT

The income statement is a powerful tool for decision making. It portrays the flow of money and the relationship of revenues to expenses over a period of time. It tells us how much money was made in an accounting period such as a year. The terms profit, net income, and earnings are commonly, interchangeably, and somewhat loosely used to state the bottom line.

The income statement provides a starting point in the analysis of a business. The popular press frequently reports earnings and nothing more: “Today U.S. Widgets reported quarterly income of \$240 million.” This is positive (unless the marketplace expected it to report \$480 million), but there is more to the story.

Choosing a Reporting Method

The measurement of net income is an attempt to match the value generated by a business (its revenues) with the resources it consumes (its expenses). The sentence “In fiscal year 2017, we sold \$200 million of product and services, at a cost of \$175 million, for a profit of \$25 million,” quantifies the operation of the business over a one-year period. The business now has a track record, a place to begin the analysis of its operations.

However, you need more detail than what’s required to measure and report income in a generally accepted fashion. Accountants use a series of conventions that strengthen the validity of the income statement. If you read an income statement that you believe to have been prepared using these conventions, you generally have greater faith that the information is valid and credible. Perhaps the company is worth investing in or lending money to.

There is no one way to structure an income statement. Your choice depends on how you intend to use the statement and what picture you want to present. The key is that the information be useful in support of decision making. Your audience could be potential investors, creditors, or internal (sometimes external) managers.

Figures 1.1 to 1.4 show some examples of commonly used income statement formats.

	A	B	C	D
1	FiberOps, Inc.			
2	Income Statement			
3	For the year ended December 31, 2018			
4		(\$000)		
5				
6	Net Sales	\$ 97		
7	Cost of Goods Sold	\$ 42		
8	Gross Margin	\$ 55		
9	Selling, General, and Administrative Expenses	\$ 33		
10	Operating Profit (Earnings Before Interest and Taxes)	\$ 22		
11				
12	Nonoperating Income (Expenses)			
13	Interest	\$ 5		
14	Other	\$ (1)		
15	Income Before Taxes	\$ 26		
16	Provision for Taxes	\$ 5		
17	Net Income	\$ 22		
18	Preferred Dividends	\$ 5		
19	Net Income Available for Common Shareholders	\$ 16		
20				

Figure 1.1 An income statement format suitable for external reporting usually omits details such as inventory levels but includes all categories that affect net income.

Case Study: Documentation for a Bank Loan

Your company wants to take out a bank loan for the purchase of new factory equipment. As the company's chief operating officer, you oversee the day-to-day activities. You also stay focused on topics such as the amount of your costs relative to your revenue, and what your profit margins are on a product-by-product basis

When it evaluates your company's loan application, the bank has only a secondary interest in those matters. Issues such as variable costs and product line profit margin are important, of course, but those are management issues. Items that matter to a lender bear directly on the company's ability to service a loan: its sales volume, gross profit and operating profit. You could use a format such as the one shown in [Figure 1.1](#) for the income statement that accompanies your loan application.

[Figure 1.1](#) shows a typical layout of an income statement used for external reporting

purposes. Notice that there are apparent math errors in the report, in rows 17 and 19. These can appear when a currency format obscures significant digits. When, for purposes of space and simplicity, you divide actual figures by, say, 1,000 and indicate by a column header that the entries are in \$1,000s, *consider* using Excel's ROUND() function. For example:

```
=ROUND(4690/1000,0)
```

Had this been used in cell B16 of Figure 1.1 instead of the actual entry of 4.69 (which the cell format displays as \$5), the result of the calculation in cell B17 would have been shown as \$21 instead of \$22.

I put the word “consider” in italic just now because the ROUND function can create as many problems as it solves. To continue this example, if you used ROUND in cell B16 of Figure 1.1, cell B17 would indeed show \$21 instead of \$22. But then cell B19 would show \$16 when its true value is \$15. In general, you must choose between two alternatives in this sort of situation:

- Bite the bullet and choose to show exact figures instead of rounded or truncated values. The downside is that your financials can appear cluttered and more difficult to comprehend.
- Use the ROUND function (or one of its close cousins, ROUNDUP and ROUNDDOWN) to get an integer or to otherwise limit the number of decimals in a value. Include a note that totals may appear inaccurate due to rounding. The downside is that in the course of solving one apparent math error, you might induce another.

Caution

You can also choose to set the precision of calculation to the precision used in the display, but that's a risky procedure. Doing so permanently changes a value stored as 4.69 to its displayed appearance, which might be 5. This is seldom a good idea. However, if you must do so, you can click the File tab, select Options, and then click Advanced. Scroll down to the When Calculating This Workbook section and select the Set Precision As Displayed check box. To locate that check box in versions of Excel prior to Office 2007, choose Tools, Options and click the Calculation tab.

Just as there are many uses for income statements, there are many ways to structure income statements. The same firm might modify and adjust its report of income and costs based on the purpose it has in mind; as a result, the income statements need to

reflect different sets of requirements.

Cells in Excel

If you're new to Excel, you might find the preceding discussion obscure—maybe even pointless. There is something about Excel (actually, about any worksheet application) that is absolutely fundamental but often goes unsaid: What is in a cell isn't necessarily what the cell displays. Furthermore, a cell can contain either a value or a formula that results in a value.

Suppose that you open a new workbook, select cell A1 on Sheet1, type the number 2.51, and press Enter. You see 2.51 in the cell, and you also see 2.51 in the Formula box. (That's the box just above the column headers and just to the right of the f_x symbol.) In this case, what you see in the cell is what the cell contains.

Now click the Home tab on the Ribbon, and click twice the Decrease Decimal button in the Number group. You now see the number 3 in cell A1, but you still see 2.51 in the Formula box. The reason is that when you click the Decrease Decimal button, you alter the cell's appearance—its number format, in this example—but not the value stored in the cell. And when you decrease the number of visible decimals to zero, Excel responds by rounding the display to the nearest integer.

Note

If you're wondering why you get a 3 instead of a 2 when you decrease the decimals displayed for the value 2.51, you're thinking along the right lines. Microsoft could have chosen either to round the display of 2.51 to 3 or to truncate the display from 2.51 to 2. But rounding is less wrong than truncation, twice as often.

If you now use cell A1 as part of a formula in another cell, that formula uses the value in A1 regardless of the number format you've chosen to use for A1. For example, suppose you enter this formula:

`=5 - A1`

in cell A2. That formula would result in the value 2.49 (that is, $5 - 2.51$). It would not result in the value 2, as it would if it subtracted 3 from 5. Changing a cell's number format alters its apparent value but not its actual value. In short, what you see isn't

necessarily what you get.

Now suppose that instead of entering 2.51 in cell A1, you started by entering this formula in A1:

=3 - .49

You still see 2.51 in the cell, but now the Formula box shows the formula. You can take this as one of the rare instances of “always” in Excel: The Formula box always shows a visible cell’s contents. The cell usually shows the value, whether the cell contains an actual value or a formula. (The exception is when you set an Excel option to show formulas, not their results, in cells.)

With the formula instead of the value in the cell, you can still use the Decrease Decimal button to cause the cell to show 3 instead of 2.51. So, in a case like this, you might not see the cell’s actual value anywhere; the Formula box shows the formula, and the cell shows the formula’s result as modified by the number format.

As I wrote at the outset of this section, if you’re new to Excel, these distinctions might seem obscure and pointless. But dealing with them quickly becomes second nature. That said, we can return to the issue of the design of income statements in Excel.

Case Study: Inventory Control in a Merchandising Firm

You are in charge of purchasing products for resale by a retail store. To hold down inventory carrying costs and avoid the use of cash until absolutely necessary, you have instituted Just in Time inventory procedures. If these procedures are working as you designed, your inventory levels at the end of the year should be about the same as—or, ideally, lower than—the levels at the start of the year and should align with the turnover of the products your business sells. For your management purposes, you might arrange to obtain an income statement like the one shown in [Figure 1.2](#).

	A	B	C	D	E
1	Davis Office Furniture				
2	Income Statement				
3	For the year ended December 31, 2018				
4					
5		(\$000)	(\$000)		
6					
7	Sales		\$ 332		
8	Less Cost of Goods Sold				
9	Opening Inventory	\$ 43			
10	Add Purchases	\$ 52			
11	Goods Available for Sale	\$ 95			
12	Ending Inventory	\$ 27			
13	Cost of Goods Sold	\$ 68			
14					
15	Gross Margin		\$ 264		
16					
17	Less Operating Expenses				
18	Administrative Expenses	\$ 82			
19	Selling Expenses	\$ 51			
20	Operating Expenses		\$ 133		
21					
22	Operating Income		\$ 131		
23					

Figure 1.2 *An income statement format suitable for certain management purposes in a merchandising firm might exclude dividend information but provide details on inventory levels.*

A manufacturing firm might use a different format for an income statement (see [Figure 1.3](#)).

	A	B	C	D
1	Clark Manufacturing, Inc.			
2	Income Statement			
3	For the year ended December 31, 2018			
4				
5		(\$000)	(\$000)	
6				
7	Sales		\$ 223	
8	Less Cost of Goods Sold			
9	Opening Finished Goods Inventory	\$ 58		
10	Cost of Goods Manufactured (see Supplement)	\$ 127		
11	Goods Available for Sale	\$ 185		
12	Ending Finished Goods Inventory	\$ 62		
13	Cost of Goods Sold	\$ 123		
14				
15	Gross Margin		\$ 100	
16				
17	Less Operating Expenses			
18	Administrative Expenses	\$ 34		
19	Selling Expenses	\$ 20		
20	Operating Expenses		\$ 54	
21				
22	Operating Income		\$ 46	
23				

Figure 1.3 An income statement for a manufacturing firm, formatted for planning purposes, often includes detailed information about the cost of goods manufactured in a supplement.

The major difference between the structure of the manufacturing firm's income statement and that of the merchandising firm is in the cost of goods sold. For the manufacturer, the cost of goods manufactured is added to the opening inventory. For the merchandiser, purchases from suppliers are added to the opening inventory. The manufacturer is likely to have various cost subcategories within the cost of goods manufactured, such as raw materials, factory overhead, and labor costs; these are often detailed in a supplement to the income statement. These subcategories do not appear in the merchandiser's income statement; the cost of purchases is seldom broken down further—although they certainly could be, to help product management meet its goals.

For example, one special type of income statement supports the management of the business from the perspective of specific products and expenses. The amount of detail in the income statement should be tailored to the manager's data requirements. [Figure 1.4](#) shows an example.

	A	B	C	D	E
1	Jensen Consulting, Inc.				
2	Income Statement				
3	For the year ended December 31, 2018				
4					
5	Revenues				
6	Hardware Resale	\$60,965			
7	Software Development	\$23,726			
8	Systems Installation	\$38,697			
9	Total		\$123,388		
10					
11	Expenses				
12	Wages and Salaries	\$86,372			
13	Pensions and Benefits	\$14,807			
14	Conference and Travel	\$ 5,284			
15	Communications	\$ 1,532			
16	Training	\$ 865			
17	Office Supplies	\$ 498			
18	Materials	\$ 356			
19	Total		\$109,714		
20					
21	Direct Margin		\$ 13,674		
22					
23					

Figure 1.4 An income statement format that is used for the management of revenues and expenses shows how funds were acquired and spent.

This income statement excludes items such as interest and amortization, and a manager can use it to analyze everyday operations. It provides a more targeted view of revenue and expense and is an example of the type of income statement a manager needs to guide a department.

Ideally, you should tailor the income statement to a format that you and your managers can use routinely. You can expand the level of detail shown in [Figures 1.1](#) to [1.4](#) to include the data that you need most often. Here, both judgment and creativity become critical. A simple reformat of data or an added detail line item can enrich your insight into the way your business operates.

For example, you could drive the behavior of your management team by means of a link between your bonus systems and a customized income statement. Suppose that you want to get your sales force to concentrate on developing new accounts. Your income statement might show revenue figures for sales both to existing accounts and to new business, and it might include cost figures for bonuses paid for new business. This could help prod the sales force to concentrate on the more difficult process of new business sales.

As [Figures 1.1](#) to [1.4](#) imply, there are many possible ways to structure an

income statement. Each one reflects a different set of circumstances, defined by the business's specific situation. There are guidelines, but there is also flexibility within those guidelines to tailor a statement to your needs. Your business and the way you want to use the data set the direction for the type of income statement to use.

Measuring the Operating and Nonoperating Segments

An income statement records the flow of resources over time. Operating income measures the extent to which revenues generated during the accounting period exceeded the expenses incurred in producing the revenues. This measure tells whether the firm's core operating business made money.

Note

It's useful to distinguish operating income, the difference between revenues and expenses, from net income, which takes the additional effect of taxes, interest, and other charges into account.

Income statements commonly divide this resource flow into operating and nonoperating segments. The operating segment represents what occurred on a day-to-day basis to generate income. The nonoperating segment represents the assets that the firm might have financed, the tax impacts of being in business, and extraordinary occurrences such as the one-time sale of a major company asset.

When you analyze a business, it is important to keep the two segments separate. If you were considering the expansion of your own business, you might first ask yourself whether the firm made money and whether you can fund an expansion with the profits. Your focus would be on the numbers produced by your normal, everyday business operations; you would not want to base your decision on the effect of a one-time, unique event. You would take that event into consideration, but you would not rely on its effect in your forecast of future earnings.

An income statement's operating segment represents the results of the company's major, ongoing activities, and the nonoperating segment represents all the company's secondary or ancillary activities. The company needs to understand both segments to grasp the total picture and know how best to prepare for its future.

MOVING FROM THE GENERAL JOURNAL TO THE INCOME STATEMENT

In the past, it's been typical for a business to record its daily transactions in a general journal. This record keeps track of every individual transaction in every account, such as cash investments, cash paid, accounts receivable, accounts payable, and so on.

In more recent years, the availability of relatively inexpensive accounting software has changed all that. As recently as the 1990s, for example, an accounting package for a small business could easily cost \$10,000 and provide much more functionality than was needed. In 2018, a business can buy adequate accounting software for a few hundred dollars or less.

One result is that we're now entering information about product sold, sales price, sales tax, customer name, income account, and asset account into a specially designed window instead of in a ruled journal. The days of green eyeshades and sleeve garters are gone for good. (Nevertheless, and although it's usually hidden from view, all that sales and expense information is still going into a general journal that your accounting software maintains.)

Your business might involve a few high-value transactions during an accounting period, and if so you might prefer to forego the benefits of specialized accounting software. Even if the direct cost of the software is trivial, there's still a learning curve. In that case, you might want to exercise the greater control that's available to you in a generalized worksheet environment such as Excel's. And then you'll want to know more about journals, information of the sort discussed here.

Or, if you have decided to invest in accounting software—and that's your likelier choice—it will be easier for you to understand what's going on inside the black box if you have a glance at the remaining material in this chapter and in [Chapter 2, “Balance Sheet: Current Assets.”](#)

Getting the General Journal into Excel

Many different software programs are available to help you record and store information about your business transactions. Some programs provide the user with conveniences such as a predefined chart of accounts and automatic linkages between journals, ledgers, and other reports. Therefore, many people prefer to use software other than Excel to gather information on individual transactions. (A chart of accounts is simply a list that associates account names and purposes with numbers that identify the account. For example, you might decide to identify the liability account named

Accounts Payable with the number 20000.) For a *very* small business, Excel is a sensible choice of platform for entering, storing, and retrieving information about individual transactions. (Normally, for these purposes, Excel is less powerful and flexible than a true database such as Oracle or, on a smaller scale, Microsoft Access. But the differences in power and flexibility are virtually meaningless when a relatively small amount of data is involved.)

But keep in mind that Excel is not designed as a specialized, full-featured accounting package. If you choose Excel to handle your accounting, you have to build many features from scratch, including your own categories for transactions, the double entry of individual transactions, and so on. Excel is much better suited to summarizing and analyzing the transaction data that you get from some other source—often, single-purpose accounting software.

After you have imported the data into Excel, you can manipulate it to meet your requirements, including anything from category subtotals to statistical analysis. Few accounting packages directly support the detailed financial analysis of accounting data, but most provide an export feature that creates data files that Excel can open.

On the other hand, if you enter and store individual transactions using software other than Excel, you might occasionally have difficulty importing files into Excel. Although most such programs have an option that enables you to export data in ASCII (text) format, the arrangement of the exported data might not be ideal for import into Excel. Other accounting packages can export directly into Excel, but then the worksheet that the accounting package creates might have features that you could do without.

For example, some programs export each part of a record onto a different line of the ASCII file: one line for the account number, another line for the account name, another line for the transaction amount, and so on. However, most of Excel's data and charting tools work best with data laid out as a list (or, since Excel 2007, as a table): different records in different rows and different fields in different columns. To take advantage of this layout, you would need to do some preliminary work with the accounting package's export file.

Note

Attractive alternatives include the use of Structured Query Language (SQL) tools, ActiveX Data Objects (ADO), and Data Access Objects. If the accounting software that handles your transactions conforms to certain standards, you can arrange to import the data into Excel in a form that is

ready for use in reports such as income statements and balance sheets.

► You can find additional information on the tools mentioned in the previous Note in [Chapter 17, “Importing Business Data into Excel.”](#)

Certainly, you can import ASCII files into an Excel worksheet quite easily by clicking the File tab, clicking Open, and then choosing Text Files from the drop-down to the right of the File edit box (prior to 2007, start by choosing File, Open).

However, after you have imported the information, you might find it necessary to move the account name and the transaction amount onto the same line as the account number. If you have many records to import, this cutting and pasting can become tedious, and you should consider recording and then running an Excel macro to do the rearrangement for you.

Note

In Excel, a *macro* is a collection of statements written in a version of the BASIC programming language. Excel is capable of recording statements that mimic exactly what you do in the Excel graphical user interface. When you're ready to perform a sequence of actions in an Excel worksheet, turn on the macro recorder. (There's a Macro Recorder button on Excel's Status bar, near its left edge.) Perform your actions and then click the Macro Recorder button again to turn it off. You can now play the macro back from the Ribbon's Developer tab to repeat the recorded actions. For this procedure to be really useful, you need some familiarity with BASIC so that you can tweak the recorded commands.

As another example of the issues involved with importing, QuickBooks applies Excel's Text format to certain cells in exported reports, such as its income statements. To do so is unnecessary, because Excel's General format recognizes and displays both text and numeric values properly. The Text format is also annoying; if you want to put a formula in a cell that's formatted as Text, you first must reformat the cell to General or to one of Excel's numeric formats. Otherwise, Excel interprets your formula as text and won't calculate it.

In other words, there are some real conveniences and advantages to using an

accounting package, even for a very small business. But be aware that the subsequent use of Excel's powerful financial analysis capabilities on the accounting data often requires that you do some preliminary work with the exported figures.

Understanding Absolute, Relative, and Mixed References

The user of a popular accounting package writes, "I click Export Report and select Export to a New Excel Spreadsheet. The export itself works fine, but then if I copy a column and paste it into my existing financial report spreadsheet, the formulas change and are incorrect."

The problem is that the accounting package being used provides formulas that refer to cells in a way that can change, depending on where the formulas are placed—and that's just what happens when the user pastes a column into an existing financial report spreadsheet. In this particular case, the accounting package was the source of the error, but there are plenty of other causes for this kind of problem—including other Excel users, people you thought were your friends.

To avoid this sort of problem, you need to be familiar with how Excel handles your data—particularly how it refers to worksheet cells. Excel has three different kinds of cell references: absolute, relative, and mixed.

Consider this formula:

```
=SUM($A$1:$B$2)
```

Entered into a cell in a worksheet, the formula returns the total of the values in cells A1, A2, B1, and B2. The range of cell addresses between the parentheses implies a rectangle of cells. The first address (here, \$A\$1) identifies the rectangle's upper-left corner, and the second address (\$B\$2) identifies its lower-right corner. The colon, called the range operator, tells Excel to include all the other cells that are in the rectangle: in this case, A2 and B1.

Suppose that you entered the formula =SUM(\$A\$1:\$B\$2) in cell C3. If you then copied the formula from cell C3 and pasted it into cell Q15, or cell AA100, or cell XFD1048576, it would still refer to that same range of cells, \$A\$1:\$B\$2. It's an absolute reference—made absolute by the dollar signs that precede the column letters and row numbers.

In contrast, suppose you entered this formula into cell C3:

```
=SUM(A1:B2)
```

It has no dollar signs. It's a relative reference—relative to whatever cell was active when you created the reference. In this example, you enter the formula into cell C3. If you now copy and paste the formula into cell D3 (same row, one column to the right), the formula adjusts accordingly and becomes this:

```
=SUM(B1:C2)
```

Using words instead of cell addresses: Paste the copied formula one column to the right of where you originally entered it, and the relative reference responds by adjusting its columns in the same direction and distance: A becomes B, and B becomes C.

Similarly, if you copied it from cell C3 and pasted it into cell C4, it would become this:

```
=SUM(A2:B3)
```

Copy the formula down one row, and the row numbers in the relative reference adjust: 1 becomes 2, and 2 becomes 3.

Another way of thinking about this is that the original formula pointed to a rectangle of cells that starts two columns left and two rows up from the cell in which it was entered. When it's copied and pasted into a different cell, the formula still points to cells starting two columns left and two rows up. This behavior is characteristic of relative references.

A third type of reference is the mixed reference, in which either the column or the row—but not both—is anchored by means of the dollar sign. For example:

```
=SUM($A1:$A2)
```

If you enter this formula into cell A3, you can copy and paste it to a cell in any other column, and it will still depend on values in column A; the dollar signs anchor it to that column. But if you copy it from cell A3 into any other row, the rows in the reference will adjust accordingly. So if you copied the formula from cell A3 into cell B4, the formula in B4 would be this:

```
=SUM($A2:$A3)
```

The dollar sign before the column letter anchors the formula to that column. The dollar sign's absence before the row number allows the reference to adjust if you move it up or down. The analogous effect occurs with another sort of mixed reference:

```
=SUM(A$2:A$3)
```

which provides an anchor to rows 2 and 3 but allows the column reference to shift.

Note

The same is true with range names. By default, Excel makes absolute the cell or range of cells that a range name refers to. But you can control the reference when you establish it using Define Name, or edit it with the Name Manager, making the reference mixed or relative. See the Introduction for a brief discussion of range names.

Getting the Journal Data to the Ledger

Whether you enter the general journal data directly into Excel or import it from another software application, the next step is usually to collect the transactions in their proper accounts within the general ledger. [Figure 1.5](#) shows an example of entries in a general journal, and [Figure 1.6](#) shows how you can collect these entries in the general ledger.

JournalDebits							686.24
	A	B	C	D	E	F	
1		General Journal					
2		Account Titles and	Account				
3		Explanation	Number	Debit	Credit		
4							
5	6/1/18	Office Equipment	22	\$ 686			
6	6/1/18	Accounts Payable	30		\$ 686		
7		Purchase of Laser Printer					
8							
9	6/3/18	Office Lease	21	\$1,187			
10	6/3/18	Cash	1		\$1,187		
11		Office Rent, June					
12							
13	6/7/18	Accounts Receivable	40	\$ 717			
14	6/7/18	Sales	60		\$ 717		
15		Sold 1 Model VM3262					
16							
17	6/9/18	Telephone Expense	23	\$ 85			
18	6/9/18	Accounts Payable	30		\$ 85		
19		May phone bill					
20							
21	6/10/18	Salaries	50	\$3,458			
22	6/10/18	Cash	1		\$3,458		
23		Jones and Smith for May					
24							
25	6/13/18	Subscriptions	29	\$ 10			
26	6/13/18	Cash	1		\$ 10		
27		Courier, 3 months					
28							

Average: \$1,024 Count: 6 Sum: \$6,144

Figure 1.5 General journal entries record individual transactions in chronological order as debits and credits.

The screenshot shows an Excel spreadsheet titled "General Ledger" with the following data:

	A	B	C	D	E	F	G	H
1			General Ledger					
2								
3	Date		Account	Account	Debit	Credit		
4	Jun-18		Name	Number				
5								
6			Cash	1	\$ -	\$4,656		
7								
8			Office Lease	21	\$1,187	\$ -		
9								
10			Office Equipment	22	\$ 686	\$ -		
11								
12			Telephone Expense	23	\$ 85	\$ -		
13								
14			Subscriptions	29	\$ 10	\$ -		
15								
16			Accounts payable	30	\$ -	\$ 772		
17								
18			Accounts receivable	40	\$ 717	\$ -		
19								
20			Salaries	50	\$3,458	\$ -		
21								
22			Sales	60	\$ -	\$ 717		
23								
24					<u>\$6,144</u>	<u>\$6,144</u>		
25								
26								
27								

The formula bar at the top shows the formula for cell F6: `{=SUM(IF(MONTH(EntryDate)=MONTH(LedgerDate),1,0)*IF(AccountNumber=GLAccount,1,0)*JournalCredits)}`

Figure 1.6 General ledger entries accumulate individual transactions from the general journal into specific accounts.

For ease in collecting the general journal entries into the general ledger, four range names are defined on the general journal sheet shown in [Figure 1.5](#): EntryDate ($\$A\$5:\$A\26), AccountNumber ($\$C\$5:\$C\26), JournalDebits ($\$D\$5:\$D\26), and JournalCredits ($\$E\$5:\$E\26).

Two additional names are defined in the General Ledger shown in [Figure 1.6](#): LedgerDate, a name defined by an absolute reference, refers to cell $\$A\4 . GLAccount (short for general ledger account) refers to a cell in column D. That's ambiguous, but it's easily clarified.

Suppose that the General Ledger worksheet is active, and its active cell is in row 6—say, E6. If you now click the Ribbon's Formulas tab and click Define Name in the Defined Names group, you can then type GLAccount in the Name box. In the Refers To box,

type this formula:

=D6

This mixed reference means that you can type this formula

=GLAccount

into any column and any row and get a meaningful result. Because its column is fixed and its row is relative, the latter formula returns whatever value is in the row where the formula is entered, in column D.

Note

However, entering the =GLAccount in the column that it points to causes a circular reference, just as though you entered =D4 into cell D4.

The effect of this referencing on how the names work is explained in more detail later in this section.

On the General Ledger worksheet, the following array formula in its Debit column accumulates the appropriate entries from the General Journal:

=SUM(IF(MONTH(EntryDate)=MONTH(LedgerDate),1,0)*IF(AccountNumber = GLAccount,1,0)*JournalDebits)

This array formula accumulates the appropriate credits in column F:

=SUM(IF(MONTH(EntryDate)=MONTH(LedgerDate),1,0)*IF(AccountNumber = GLAccount,1,0)*JournalCredits)

Note

The two General Journal formulas just shown must be entered as array formulas. After typing the formula, simultaneously hold down Ctrl+Shift and press Enter. In the formula bar, you will see a pair of curly braces around the formula. This indicates that Excel has accepted the formula as an array

formula. Do not enter the braces yourself from the keyboard, or Excel will interpret the formula as text.

The formulas instruct Excel to do the following:

1. `IF(MONTH(EntryDate)=MONTH(LedgerDate),1,0)`: Evaluate each entry in the General Journal's EntryDate column. If the month of that date equals the date for the General Ledger, return 1; otherwise, return 0.
2. `IF(AccountNumber = GLAccount,1,0)`: Evaluate each entry in the General Journal's AccountNumber column. If the account number is the same as the account number for the current General Ledger account, return 1; otherwise, return 0.
3. Multiply the result of step 1 by step 2. Only when both conditions are true will this step return a 1; otherwise, it will return 0.
4. Multiply the result of step 3 by the General Journal's entries in the JournalDebits range (or its JournalCredits range, in the second of the previous two formulas). When both the date condition and the account condition are true, the result is the debit (or the credit); otherwise, the result is 0.
5. Return the sum of step 4 as applied to all the journal entries: specifically, a debit or credit if the entry passes both the date and the account conditions, and 0 otherwise.

Be sure that you understand the following aspects of the names used in these formulas.

No Provision for Different Workbooks

The range names assume that both the general journal and the general ledger worksheets belong to the same workbook. If the general journal belonged to a workbook named, say, General Journal.xls, the definitions of the names in the formulas would have to be qualified by references to that workbook. For example:

```
= 'C:\Financials\[General Journal.xls]JournalSheet'!JournalDebits
```

Both Absolute and Mixed References Are Used

Consider the definitions of the names LedgerDate and GLAccount. LedgerDate refers to cell `A4`: Because this is an absolute reference (note the two dollar signs), LedgerDate returns the same value, regardless of the location of the cell where it is entered.

GLAccount, on the other hand, refers to the cell in column D and in the row where the formula that uses the GLAccount name is located. Entered in E6, then, GLAccount refers to D6; entered in F16, GLAccount refers to D16. This is a mixed reference: Only the column is fixed, and the row changes depending on where the reference to GLAccount is entered.

Therefore, this formula, if entered in cell F6 and shown in [Figure 1.6](#), uses the value 1 (in cell D6) for GLAccount:

```
=SUM(IF(MONTH(EntryDate)=MONTH(LedgerDate),1,0)*IF(AccountNumber =  
GLAccount,1,0)*JournalCredits)
```

But if the formula is entered into cell F8, it uses the value 21 (in cell D8). Because the name GLAccount refers to the mixed reference \$D and whatever row the name is used in, the name itself acts as a mixed reference.

Note

This is also an instance of Excel's implicit intersection. See [Chapter 11](#), "[Examining a Business Case: Investment](#)," for a discussion of what an implicit intersection is and how it can make your life easier.

The effect of the mixed reference in this case is to anchor the reference to column D because of the dollar sign before the column letter and to allow the row to adjust because of the absence of a dollar sign before the row number.

By using these formulas, all the individual transactions from the General Journal are accumulated into the General Ledger, according to the account that they have been posted to and according to the correct date for the current General Ledger entry.

Tip

If you're familiar with Excel's pivot tables, you might wonder why you would not use one to summarize data from the general journal into a general ledger. You can do so if you arrange the general journal data as a three-column list or table: one column containing the name of the account, one column identifying the transaction as a debit or a credit, and the third column containing the amount. Now, if you use that list as the source data for a pivot

table, with the account name as the Row field, the type of transaction (debit or credit) as the Column field, and the amount as the Data field, your pivot table will emulate a general ledger.

To test your grasp of this admittedly complex topic in Excel formulas, open the Excel workbook for this chapter (available via download from the publisher's website). Activate the General Journal and modify, say, one of the Cash account credits—add \$100 to it, for example. Then activate the General Ledger worksheet and note what has happened to the Cash account as a result.

Another way to become familiar with the structure of these formulas is to activate one on the General Ledger, and then start the Evaluate Formula tool (in the Formula Auditing group on the Ribbon's Formulas tab). Then repeatedly press the Evaluate button to wend your way through Excel's interpretation of the formula.

Getting the Ledger Data to the Income Statement

You can use a similar approach to accumulate the information in the general ledger into your income statement. Assume that you're working with a different general ledger than the one shown in [Figure 1.6](#).

Suppose you have decided to number all fixed administrative expense accounts using five-digit account numbers beginning with 63. Health insurance might be account number 63310, vehicle insurance 63320, interest expense 63400 and so on. If you name the range in the general ledger that contains the account numbers as `LedgerAccounts`, the range containing the credits as `LedgerCredits`, and the range containing the debits as `LedgerDebits`, this array formula totals the differences between general ledger credits and general ledger debits for accounts numbered 63000 to 63999:

```
=SUM(IF(LEFT(LedgerAccounts,2)="63",LedgerCredits-LedgerDebits,0))
```

(Remember to enter the formula as an array formula. Use Ctrl+Shift and then press Enter.)

The array formula first evaluates the elements in the range named `LedgerAccounts` and strips off the two leftmost characters in each account number. Then, if those two characters equal 63 (as they will if the account number is between 63000 and 63999, inclusive), the formula returns the sum of the difference between the accounts' debits and credits.

You could use the formula to return the entry in your income statement that pertains to fixed administrative expenses. Similarly, if your chart of accounts assigned all account categories pertaining to fixed production expenses to five-digit numbers beginning with 64, you would use this:

```
=SUM(IF(LEFT(LedgerAccounts,2)="64",LedgerCredits-LedgerDebits,0))
```

You can accumulate most of the entries on an income statement in a similar way, working from the general journal to the general ledger to the income statement. Two types of entries in particular—entries such as accounts payable and prepaid expenses that involve accrual, and assets that are subject to depreciation—usually require special attention. Both affect the timing of your company’s earnings. Accrual accounting is discussed in the next section.

Tip

The procedures suggested in this chapter work most easily if you maintain your general journal, general ledger, and income statement in the same workbook. However, Excel does not permit you to use the same name more than once in the same workbook unless you qualify it with a sheet name. So, you cannot create two instances of a range named Debits, for example—once as a name that refers to the general journal and once as a name that refers to the general ledger—in the same workbook. One option is to use names such as GeneralJournal!Debits, where GeneralJournal is the name of a worksheet. (This is the attribute that you set when you define a name’s scope in Excel 2007 or a later version.) Another option, used in the previous examples, is to use the name JournalDebits to distinguish that range from LedgerDebits.

► Depreciation is covered in the discussion of fixed assets in [Chapter 16, “Fixed Assets.”](#)

It’s worth mentioning again that true double entry accounting applications take care of all this data management for you. Following are the reasons to handle it yourself in Excel:

- Having a business that requires relatively few transactions per accounting period

- Exercising the greatest amount of flexibility possible over the way the business's books are managed
- Getting a fundamental understanding of the actions that an accounting package takes but that it doesn't demonstrate for the user

MANAGING THE FINANCIAL ANALYSES WITH ACCRUAL ACCOUNTING

Accrual accounting involves two steps: identifying the revenues for a given period and matching the associated costs, such as the cost of goods sold and sales commissions, to those revenues. This is called the matching principle and is a basic concept used throughout the accounting process.

The notion of matching revenue to costs incurred to produce the revenue might seem obvious, but it has some subtle implications. Suppose that you purchase license plates for a company vehicle. You pay \$400 for the plates in January. You write off the full \$400 in January. (That is, you show it as a cost that you incurred fully during that month.) You produce revenue or otherwise conduct business by using your vehicle during January and for the next 11 months.

In this case, you have overstated your cost of doing business in January, understated it from February through December, and failed to match the subsequent revenues with the initial expenditure. Accrual accounting allows you to spread the cost of the plates over (in this case) the full 12 months and to match the revenues the vehicle helps produce to the cost outlay for the license plates.

Revenue is not the same as cash received, and expense is not the same as cash spent. You normally recognize revenue when the effort required to generate the sale is substantially complete and there is reasonable certainty that you will receive payment. The accountant views the timing of the actual cash receipts, or the actual cash outlay, as only a technicality.

Note

Small businesses often use another approach, termed the cash method, instead of the accrual method. Under the cash method, the business records revenue when the cash is received and records costs or expenses when the cash is spent. Although the cash method is a less accurate means of associating revenues with costs and expenses, small businesses sometimes