After studying this chapter, you should be able to:

1. Differentiate between fixed and variable costs.
2. Calculate operating and cash break-even points, and find the number of units that need to be sold to reach a target level of EBIT.
3. Define the terms “business risk” and “financial risk,” and describe the origins of each of these risks.
4. Use Excel to calculate the DOL, DFL, and DCL, and explain the significance of each of these risk measures.
5. Explain how the DOL, DFL, and DCL change as the firm’s sales level changes.

In this chapter, we will consider the decisions that managers make regarding the cost structure of the firm. These decisions will, in turn, impact the decisions they make regarding methods of financing the firm’s assets (i.e., its capital structure) and pricing the firm’s products.

In general, we will assume that the firm faces two kinds of costs:

1. Variable costs are those costs that are expected to change at the same rate as the firm’s sales. Variable costs are constant per unit, so as more units are sold, the total variable costs rise. Examples of variable costs include sales commissions, costs of raw materials, hourly wages, and so on.
2. *Fixed costs* are those costs that are constant regardless of the quantity produced, over some relevant range of production. Total fixed cost per unit will decline as the number of units increases. Examples of fixed costs include rent, salaries, depreciation, and so on.

Figure 6-1 illustrates these costs.¹

---

**Figure 6-1**

**Total Fixed and Total Variable Costs**

---

**Break-Even Points**

We can define the *break-even point* as the level of sales (either units or dollars) that causes profits (however measured) to equal zero. Most commonly, we define the break-even point as the unit sales required for earnings before interest and taxes (EBIT) to be equal to zero. This point is often referred to as the *operating break-even point*.

Define $Q$ as the quantity sold, $P$ as the price per unit, $V$ as the variable cost per unit, and $F$ as total fixed costs. With these definitions, we can say:

$$Q(P - V) - F = EBIT$$

---

1. Most firms will also have some semi-variable costs that are fixed over a certain range of output, but will change if output rises above that level. For simplicity, we will assume that these costs are fixed.
If we set EBIT in equation (6-1) to zero, we can solve for the break-even quantity ($Q^*$):

$$Q^* = \frac{F}{P - V} \quad (6-2)$$

Assume, for example, that a firm is selling widgets for $30 per unit while variable costs are $20 per unit and fixed costs total $100,000. In this situation, the firm must sell 10,000 units to break even:

$$Q^* = \frac{100,000}{30 - 20} = 10,000 \text{ units}$$

The quantity $P - V$ is often referred to as the *contribution margin* per unit, because this is the amount that each unit sold contributes to coverage of the firm’s fixed costs. Using equation (6-1), you can verify that the firm will break even if it sells 10,000 widgets:

$$10,000(30 - 20) - 100,000 = 0$$

We can now calculate the firm’s break-even point in dollars by simply multiplying $Q^*$ by the price per unit:

$$BE = P \times Q^*$$

(6-3)

In this example, the result shows that the firm must sell $300,000 worth of widgets to break even.

Note that we can substitute equation (6-2) into (6-3):

$$BE = P \times \frac{F}{P - V} = \frac{F}{(P - V)/P} = \frac{F}{CM\%}$$

(6-4)

So, if we know the contribution margin as a percentage of the selling price ($CM\%$), we can easily calculate the break-even point in dollars. In the previous example, $CM\%$ is 33.33%, so the break-even point in dollars must be:

$$BE = \frac{100,000}{0.3333} = 300,000$$

which confirms our earlier result.
Calculating Break-Even Points in Excel

We can, of course, calculate break-even points in Excel. Consider the income statement for Spuds and Suds, a very popular sports bar that serves only one product: a plate of gourmet french fries and a pitcher of imported beer for $16 per serving. The income statement is presented in Exhibit 6-1.

Before calculating the break-even point, enter the labels into a new worksheet as shown in Exhibit 6-1. Because we will be expanding this example, it is important that you enter formulas where they are appropriate. Before doing any calculations, enter the numbers in B20:B23.

We will first calculate the dollar amount of sales (in B5) by multiplying the per unit price by the number of units sold: =B20*B21. Variable costs are always 60% of sales (as shown in B22), so the formula in B6 is: =B22*B5. Both fixed costs (in B7) and interest expense (in B9) are constants, so they are simply entered directly. The simple subtraction and multiplication required to complete the income statement through B12 should be obvious.

In B14:B17 we have added information that is not immediately useful, but the figures will become central when we discuss operating and financial leverage. In cell B14 we have...
added preferred dividends, which will be subtracted from net income. The result (in B15) is
net income available to the common shareholders. Preferred dividends are simply input into
B14, and the formula in B15 is: \(=B12-B14\). In B16, enter the number of common shares
outstanding: 1,000,000. Earnings per share is then calculated as: \(=B15/B16\) in cell B17.

Now we can calculate the break-even points. In cell A25 enter the label: Operating
Break-even Point (Units). Next, copy this label to A26, and change the word
“Units” to Dollars. In B25, we can calculate the break-even point in units using equation
(6-2). The formula is: \(=B7/(B20-B6/B21)\). Notice that we have to calculate the variable
cost per unit by dividing total variable costs (B6) by the number of units sold (B21). You can
see that Spuds and Suds must sell 62,500 units in order to break even and that they are well
above this level. We can calculate the break-even point in dollars simply by multiplying
the unit break-even point by the price per unit. In B26, enter the formula: \(=B25*B20\). You will
see that the result is $1,000,000.

Other Break-Even Points

Recall that we found the break-even point by setting EBIT, in equation (6-1), equal to zero.
However, there is no reason that we can’t set EBIT equal to any amount that we might
desire. For example, if we define EBIT\(_{\text{Target}}\) as the target level of EBIT, we find that the firm
can earn the target EBIT amount by selling:

\[
Q^\star_{\text{Target}} = \frac{F + \text{EBIT}_{\text{Target}}}{P - V}
\]  

(6-5)

Consider that Spuds and Suds might want to know the number of units that they need to sell in
order to have EBIT equal $800,000. Mathematically, we can see that:

\[
Q^\star_{800,000} = \frac{400,000 + 800,000}{16 - 9.60} = 187,500 \text{ units}
\]

need to be sold to reach this target. You can verify that this number is correct by typing 187,500
into B21 and checking the value in B8. To return the worksheet to its original values, enter
156,250 into B21.

We can do the same thing, with more flexibility, by modifying our worksheet. Select row 22
and insert a new row. In A22 enter the label: Target EBIT and in B22 enter: 800,000. In
A29 type: Units to Meet EBIT Target and then in B29 enter the formula:
\(=(B7+B22)/(B20-B6/B21)\). The result will be 187,500 units as before. However, we
can now easily change the target EBIT and see the unit sales required to reach the goal. Your
worksheet should now look like the one in Exhibit 6-2.
Recall from page 48 that we defined cash flow as net income plus noncash expenses. We do this because the presence of noncash expenses (principally depreciation) in the accounting numbers distort the actual cash flows. We can make a similar adjustment to our break-even calculations by setting EBIT\_Target equal to the negative of the depreciation expense. This results in a type of break even that we refer to as the cash break-even point:

\[ Q^{*}_{\text{Cash}} = \frac{F - \text{Depreciation}}{P - V} \] \hspace{1cm} (6-6)

Note that the cash break-even point will always be lower than the operating break-even point because we don’t have to cover the depreciation expense.
Using Goal Seek to Calculate Break-Even Points

As we’ve shown, the break-even point can be defined in numerous ways. We don’t even need to define it in terms of EBIT. Suppose that we wanted to know how many units need to be sold to break even in terms of net income. We could easily derive a formula (just use equation (6-5) and set $EBIT_{\text{Target}} = \text{Interest Expense}$), but that’s not necessary.

Excel has a tool, called Goal Seek, to help with problems like this. To use Goal Seek, you must have a target cell with a formula and another cell that it depends on. For example, net income in B12 depends indirectly on the unit sales in B21. So, by changing B21, we change B12. When we use Goal Seek, we’ll simply tell it to keep changing B21 until B12 equals zero.

Launch the Goal Seek tool by choosing What-If Analysis on the Data tab. Fill in the dialog box as shown in Figure 6-2 and click the OK button. You should find that unit sales of 78,125 will cause net income to be equal to zero. You can experiment with this tool to verify the other break-even points that we’ve found.

**Figure 6-2**
**The Goal Seek Tool**

Leverage Analysis

In Chapter 4 (page 113), we defined leverage as a multiplication of changes in sales into even larger changes in profitability measures. Firms that use large amounts of operating leverage will find that their EBIT will be more variable than firms that do not. We would say that such a firm has high business risk. Business risk is one of the major risks faced by a firm and can be defined as the variability of EBIT. The more variable a firm’s revenues, relative

---

2. For more complicated problems, use the Solver add-in.

3. The use of EBIT for this analysis assumes that the firm has no extraordinary income or expenses. Extraordinary income and/or expenses are one-time events that are not a part of the firm’s ordinary business operations. If the firm does have these items, one should use its net operating income (NOI) instead of EBIT.
to its costs, the more variable its EBIT will be. Also, the likelihood that the firm won’t be able to pay its expenses will be higher. As an example, consider a software company and a grocery chain. It should be apparent that the future revenues of the software company are much more uncertain than those of the grocery chain. This uncertainty in revenues causes the software company to have a much greater amount of business risk than the grocery chain. The software company’s management can do little about this business risk; it is simply a function of the industry in which they operate. Software is not a necessity of life. People do, however, need to eat. For this reason, the grocery business has much lower business risk.

Business risk results from the environment in which the firm operates. Such factors as the competitive position of the firm in its industry, the state of its labor relations, and the variability of demand for its products all affect the amount of business risk a firm faces. In addition, as we will see, the degree to which the firm’s costs are fixed (as opposed to variable) will affect the amount of business risk. Many of the components of business risk are beyond the control of the firm’s managers. However, managers do have some control. For example, when making investment decisions managers may be able to choose between labor-intensive and capital-intensive production methods, or they may choose between methods that have differing levels of fixed costs.

In contrast, the amount of financial risk is determined directly by management. Financial risk refers to the probability that the firm will be unable to meet its fixed financing obligations (which includes both interest and preferred dividends). Obviously, all other things being equal, the more debt a firm uses to finance its assets, the higher its interest cost will be. Higher interest costs lead directly to a higher probability that the firm won’t be able to pay. Furthermore, the use of debt financing concentrates the firm’s business risk onto fewer shareholders, making the stock riskier. Because the amount of debt is determined by managerial choice, the financial risk that a firm faces is also determined by management.

Managers need to be aware that they face both business risk and financial risk, and that both affect the stock’s beta. Therefore, these risks also affect the value of the stock and the firm’s cost of capital. If they are in an industry with high business risk, they should control the overall amount of risk by limiting the amount of financial risk that they face. Alternatively, firms that face low levels of business risk can better afford more financial risk.

We will examine these concepts in more detail by continuing with our Spuds and Suds example.
The Degree of Operating Leverage

Earlier we mentioned that a firm’s business risk can be measured by the variability of its earnings before interest and taxes. If a firm’s costs are all variable, then any variation in sales will be reflected by exactly the same variation in EBIT. However, if a firm has some fixed expenses then EBIT will be more variable than sales. We refer to this concept as operating leverage.

We can measure operating leverage by comparing the percentage change in EBIT to a given percentage change in sales. This measure is called the degree of operating leverage (DOL):

\[
DOL = \frac{\% \Delta \text{ in EBIT}}{\% \Delta \text{ in Sales}}
\]  

(6-7)

So, if a 10% change in sales results in a 20% change in EBIT, we would say that the DOL is 2. As we will see, this is a symmetrical concept. As long as sales are increasing, a high DOL is desirable. However, if sales begin to decline, a high DOL will result in EBIT declining at an even faster pace than sales.

To make this concept more concrete, let’s extend the Spuds and Suds example. Assume that management believes that unit sales will increase by 10% in 2012. Furthermore, they expect that variable costs will remain at 60% of sales and fixed costs will stay at $400,000. Copy B4:B27 to C4:C27. Now, insert a row above the tax rate in row 24. Enter the label: Projected Sales Growth, and in C24 enter: 10%. We need to have the 2012 unit sales in C21, so enter: =B21 *(1+C24) into C21. (Note that you have just created a percent of sales income statement forecast for 2012, just as we did in Chapter 5.) Change the label in C4 to 2012 and you have completed the changes.

Before continuing, notice that the operating break-even points (C27:C28) have not changed. This will always be the case if fixed costs are constant and variable costs are a constant percentage of sales. The break-even point is always driven by the level of fixed costs.

Because we wish to calculate the DOL for 2011, we first need to calculate the percentage changes in EBIT and sales. In A32 enter the label: % Change in Sales from Prior Year, and in A33 enter: % Change in EBIT from Prior Year. To calculate the percentage changes, enter: =C5/B5-1 in cell C32 and then: =C8/B8-1 in C33. You should see that sales increased by 10%, while EBIT increased by 16.67%. According to equation (6-7), the DOL for Spuds and Suds in 2011 is:

\[
DOL = \frac{16.67\%}{10.00\%} = 1.667
\]

So, any change in sales will be magnified by 1.667 times in EBIT. To see this, recall that the formula in C21 increased the 2011 unit sales by 10%. Temporarily, change the value in C24
to 20%. You should see that if sales increase by 20%, EBIT will increase by 33.33%. Recalculating the DOL, we see that it is unchanged:

\[
DOL = \frac{33.33\%}{20.00\%} = 1.667
\]

Furthermore, if we change the value in C24 to -10%, so that sales decline by 10%, we find that EBIT declines by 16.67%. In this case the DOL is:

\[
DOL = \frac{-16.67\%}{-10.00\%} = 1.667
\]

So leverage is indeed a double-edged sword. You can see that a high DOL would be desirable as long as sales are increasing, but very undesirable when sales are decreasing. Unfortunately, most businesses don’t have the luxury of altering their DOL immediately before a change in sales.

Calculating the DOL with equation (6-7) is actually more cumbersome than is required. With that equation we needed to use two income statements. However, a more direct method of calculating the DOL is to use the following equation:

\[
DOL = \frac{Q(P-V)}{Q(P-V)-F} = \frac{\text{Sales} - \text{Variable Costs}}{\text{EBIT}}
\]  \hspace{1cm} (6-8)

For Spuds and Suds in 2011, we can calculate the DOL using equation (6-8):

\[
DOL = \frac{2,500,000 - 1,500,000}{600,000} = 1.667
\]

which is exactly as we found with equation (6-7).

Continuing with our example, enter the label: Degree of Operating Leverage in A36. In B36 we will calculate the DOL for 2011 with the formula: \((B5-B6)/B8\). You should get the same result as before. If you copy the formula from B36 to C36, you will find that in 2012 the DOL will decline to 1.57. We will examine this decline in the DOL later.

Before continuing, it is worth discussing a refinement of the formula in B36. The formula that we entered could potentially cause a division by zero (#DIV/0!) error if EBIT is zero (that is, if the firm is operating exactly at its break-even point). We could use an IF statement to avoid this error. If EBIT = 0, then the function will return #N/A (Not Available) as the result. This is better than having a #DIV/0! error or simply returning zero or a blank as the result. Returning a zero can throw off the results of other formulas. For example, the COUNT function would count a zero, but not an #N/A. To return #N/A as a result in the case of an
error, we can use the NA function. This function takes no arguments, but you must put a closed pair of parentheses after it:

\[ \text{NA()} \]

Instead of using an IF statement and calculating the formula twice, we can modify the formula in B36 as follows: =IFERROR((B5-B6)/B8,NA()). Note that we have used the IFERROR function to check if the result will be an error. This function will return the first argument if it doesn’t result in an error, or the second if it does. It is defined as:

\[
\text{IFERROR}(\text{VALUE}, \text{VALUE}_{-\text{IF_ERROR}})
\]

where \text{VALUE} is any statement or formula that can be evaluated by Excel. This technique is useful anytime a formula could result in an error that might render any dependent formulas incorrect. It is better to see a result of #N/A than to see an incorrect result.

Your worksheet should now appear similar to the one in Exhibit 6-3.

**The Degree of Financial Leverage**

Financial leverage is similar to operating leverage, but the fixed costs that we are interested in are the fixed financing costs. These are the interest expense and preferred dividends.\(^4\) We can measure financial leverage by relating percentage changes in earnings per share (EPS) to percentage changes in EBIT. This measure is referred to as the degree of financial leverage (DFL):

\[
\text{DFL} = \frac{\% \Delta \text{ in EPS}}{\% \Delta \text{ in EBIT}}
\]

For Spuds and Suds, we have already calculated the percentage change in EBIT, so all that remains is to calculate the percentage change in EPS. In A34 add the label: % Change in EPS from Prior Year, and in C34 add the formula: =C17/B17-1. Note that EPS is expected to increase by 30% in 2012 compared to only 16.67% for EBIT. Using equation (6-9) we find that the degree of financial leverage employed by Spuds and Suds in 2011 is:

\[
\text{DFL} = \frac{30.00\%}{16.67\%} = 1.80
\]

---

\(^4\) Preferred stock, as we’ll see in Chapter 8, is a hybrid security, similar to both debt and equity securities. How it is treated is determined by one’s goals. When discussing financial leverage, we treat preferred stock as if it were a debt security.
Therefore, any change in EBIT will be multiplied by 1.80 times in earnings per share. Like operating leverage, financial leverage works both ways. When EBIT is increasing, EPS will increase even more. And when EBIT decreases, EPS will decline by a larger percentage.

EXHIBIT 6-3
SPUDS AND SUDS BREAK-EVEN AND LEVERAGE WORKSHEET

As with the DOL, there is a more direct method of calculating the DFL:

\[
DFL = \frac{\text{EBIT}}{\text{EBT} - \frac{\text{PD}}{(1 - t)}} \quad (6-10)
\]
In equation (6-10), PD is the preferred dividends paid by the firm, and $t$ is the tax rate paid by the firm. The second term in the denominator, $PD/(1-t)$, requires some explanation. Because preferred dividends are paid out of after-tax dollars, we must determine how many pre-tax dollars are required to meet this expense. In this case, Spuds and Suds pays taxes at a rate of 40%, so they require $166,666.67 in pre-tax dollars in order to pay $100,000 in preferred dividends:

\[
\frac{100,000}{(1 - 0.40)} = 166,666.67
\]

We can use equation (6-10) in the worksheet to calculate the DFL for Spuds and Suds. In cell A37, enter the label: Degree of Financial Leverage. In B37, enter: =IFERROR(B8/(B10-B14/(1-B25)),NA()). You should find that the DFL is 1.80, which is the same as we found by using equation (6-9). Copying this formula to C37 reveals that in 2012 we expect the DFL to decline to 1.62.

**The Degree of Combined Leverage**

Most firms make use of both operating and financial leverage. Because they are using two types of leverage, it is useful to understand the combined effect. We can measure the total leverage employed by the firm by comparing the percentage change in sales to the percentage change in earnings per share. This measure is called the *degree of combined leverage* (DCL):

\[
DCL = \frac{\% \Delta \text{ in EPS}}{\% \Delta \text{ in Sales}} \quad (6-11)
\]

Because we have already calculated the relevant percentage changes, it is a simple matter to determine that the DCL for Spuds and Suds in 2011 was:

\[
DCL = \frac{30.00\%}{10.00\%} = 3.00
\]

Therefore, any change in sales will be multiplied threefold in EPS. Recall that we earlier said that the DCL was a combination of operating and financial leverage. You can see this if we rewrite equation (6-11) as follows:

\[
DCL = \frac{\% \Delta \text{ in EPS}}{\% \Delta \text{ in Sales}} = \frac{\% \Delta \text{ in EBIT}}{\% \Delta \text{ in Sales}} \times \frac{\% \Delta \text{ in EPS}}{\% \Delta \text{ in EBIT}}
\]

Therefore, the combined effect of using both operating and financial leverage is multiplicative rather than simply additive. Managers should take note of this and use caution
in increasing one type of leverage while ignoring the other. They may end up with more total leverage than anticipated. As we have just seen, the DCL is the product of DOL and DFL, so we can rewrite equation (6-11) as:

\[ \text{DCL} = \text{DOL} \times \text{DFL} \]

To calculate the DCL for Spuds and Suds in your worksheet, first enter the label: Degree of Combined Leverage into A38. In B38, enter the formula: =B36*B37, and copy this to C38 to find the expected DCL for 2012. At this point, the lower part of your worksheet should look like Exhibit 6-4.

**EXHIBIT 6-4**

**SPUDS AND SUDS WORKSHEET WITH THREE MEASURES OF LEVERAGE**

![Worksheet Image]

**Extending the Example**

Comparing the three leverage measures for 2011 and 2012 shows that in all cases the firm will be using less leverage in 2012. Recall that the only change in 2012 was that sales were increased by 10% over their 2011 level. The reason for the decline in leverage is that fixed...
costs (both operating and financial) have become a smaller portion of the total costs of the firm. This will always be the case: *As sales increase above the break-even point, leverage will decline regardless of the measure that is used.*

We can see this by extending our Spuds and Suds example. Suppose that management is forecasting that sales will increase by 10% each year for the foreseeable future. Furthermore, because of contractual agreements, the firm’s fixed costs will remain constant through at least 2013. In order to see the changes in the leverage measures under these conditions, copy C4:C38 and paste into D4:F38. This will create pro forma income statements for three additional years. Change the labels in D4:F4 to *2013, 2014, and 2015.*

You should see that the DOL, DFL, and DCL are all decreasing as sales increase. This is easier to see if we create a chart. Select A36:F38 and use the Chart Wizard to create a Line chart of the data. Be sure to choose the Series tab and set B4:F4 as the Category (X) axis labels. You should end up with a chart that resembles the one in Figure 6-3.

---

**Figure 6-3**

*Chart of Various Leverage Measures as Sales Increase*

---

Obviously, as we stated earlier, the amount of leverage declines as the sales level increases. One caveat to this is that in the real world, fixed costs are not necessarily the same year after year. Furthermore, variable costs do not always maintain an exact percentage of sales. For these reasons, leverage may not decline as smoothly as depicted in our example. However, the general principal is sound and should be understood by all managers.
Summary

We started this chapter by discussing the firm’s operating break-even point. The break-even point is determined by a product’s price and the amount of fixed and variable costs. The amount of fixed costs also played an important role in the determination of the amount of leverage a firm employs. We studied three measures of leverage:

1. The degree of operating leverage (DOL) measures the degree to which the presence of fixed costs multiplies changes in sales into even larger changes in EBIT.
2. The degree of financial leverage (DFL) measures the change in EPS relative to a change in EBIT. Financial leverage is a direct result of managerial decisions about how the firm should be financed.
3. The degree of combined leverage (DCL) provides a measure of the total leverage used by the firm. This is the product of the DOL and DFL.

We also introduced the Goal Seek tool, which is very useful whenever you know the result that you want but not the input value required to get that result.

<table>
<thead>
<tr>
<th>Table 6-1</th>
<th>Functions Introduced in This Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td><strong>Function</strong></td>
</tr>
<tr>
<td>Return #N/A</td>
<td>NA( )</td>
</tr>
<tr>
<td>Determine if a formula returns an error value</td>
<td>IFERROR(VALUE, VALUE_IF_ERROR)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Table 6-2</th>
<th>Summary of Equations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td><strong>Equation</strong></td>
</tr>
<tr>
<td>Operating Break-Even Level in Units</td>
<td>$Q^* = \frac{F}{P - V}$</td>
</tr>
<tr>
<td>Operating Break-Even Level in Dollars</td>
<td>$SBE = P \times Q^* = \frac{F}{CM%}$</td>
</tr>
<tr>
<td>Cash Break-Even Point in Units</td>
<td>$Q_{\text{Cash}}^* = \frac{F - \text{Depreciation}}{P - V}$</td>
</tr>
</tbody>
</table>
Problems

1. Meyerson’s Bakery is considering the addition of a new line of pies to its product offerings. It is expected that each pie will sell for $10 and the variable costs per pie will be $3. Total fixed operating costs are expected to be $20,000. Meyerson’s faces a marginal tax rate of 35%, will have interest expense associated with this line of $3,000, and expects to sell about 2,500 pies in the first year.

a. Put together an income statement for the pie line’s first year. Is the line expected to be profitable?

b. Calculate the operating break-even point in both units and dollars.

c. How many pies would Meyerson’s need to sell in order to achieve EBIT of $15,000?

d. Use the Goal Seek tool to determine the selling price per pie that would allow Meyerson’s to break even in terms of its net income.

### Table 6-2 (Continued)

#### Summary of Equations

<table>
<thead>
<tr>
<th>Name</th>
<th>Equation</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of Operating Leverage (DOL)</td>
<td>[ \text{DOL} = \frac{% \Delta \text{ in EBIT}}{% \Delta \text{ in Sales}} = \frac{Q(P-V)}{Q(P-V)-F} ]</td>
<td>177</td>
</tr>
<tr>
<td>Degree of Financial Leverage (DFL)</td>
<td>[ \text{DFL} = \frac{% \Delta \text{ in EPS}}{% \Delta \text{ in EBIT}} = \frac{\text{EBIT}}{\text{EBT} - \frac{\text{PD}}{(1-t)}} ]</td>
<td>179</td>
</tr>
<tr>
<td>Degree of Combined Leverage (DCL)</td>
<td>[ \text{DCL} = \frac{% \Delta \text{ in EPS}}{% \Delta \text{ in Sales}} = \text{DOL} \times \text{DFL} ]</td>
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<table>
<thead>
<tr>
<th>Kroger Company</th>
<th>Annual Income Statements</th>
<th>For the Fiscal Years 2009 to 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>Total Revenue</td>
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<td>Cost of Goods Sold</td>
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<td>Gross Profit</td>
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<td>Depreciation And Amortization</td>
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<td>Operating, General, And Administrative</td>
<td>12,884</td>
<td>14,511</td>
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<tr>
<td>Rent</td>
<td>659</td>
<td>648</td>
</tr>
<tr>
<td>Earnings Before Interest And Taxes</td>
<td>2,451</td>
<td>1,091</td>
</tr>
<tr>
<td>Interest Expense</td>
<td>485</td>
<td>502</td>
</tr>
<tr>
<td>Earnings Before Taxes</td>
<td>1,966</td>
<td>589</td>
</tr>
<tr>
<td>Income Tax Expense</td>
<td>717</td>
<td>532</td>
</tr>
<tr>
<td>Income Before Minority Interest</td>
<td>1,249</td>
<td>57</td>
</tr>
<tr>
<td>Minority Interest</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Net Income</td>
<td>1,249</td>
<td>70</td>
</tr>
</tbody>
</table>

a. Enter the data into your worksheet. Assume that Cost of Goods Sold and Operating, General, and Administrative costs are variable. Depreciation and Rent are fixed costs.

b. Given that Kroger is a grocery company, would you expect that it would have more operating leverage or financial leverage?

c. Calculate the degree of operating leverage for each year using the assumptions from part a.

d. Calculate the degree of financial leverage for each year.

e. Calculate the degree of combined leverage for each of the three years. Does it appear that Kroger’s leverage measures have been increasing or decreasing over this period?

f. There is a spike in all leverage measures in FY 2010 (ending in January 2010). What might explain this spike?

g. Create a line chart that shows how the various leverage measures have changed over this three-year period.
3. The following is information for three local auto dealers:

<table>
<thead>
<tr>
<th></th>
<th>Bell’s Domestics</th>
<th>Junior’s Used</th>
<th>Europe’s Best</th>
<th>Industry Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Selling Price</td>
<td>$38,500</td>
<td>$29,700</td>
<td>$57,200</td>
<td>$33,000</td>
</tr>
<tr>
<td>Unit Sales</td>
<td>1,500</td>
<td>1,850</td>
<td>850</td>
<td>1,250</td>
</tr>
<tr>
<td>Interest Expense</td>
<td>825,000</td>
<td>1,100,000</td>
<td>3,300,000</td>
<td>1,650,000</td>
</tr>
<tr>
<td>Variable Costs (% of Sales)</td>
<td>60%</td>
<td>45%</td>
<td>40%</td>
<td>48%</td>
</tr>
<tr>
<td>Fixed Costs</td>
<td>10,000,000</td>
<td>7,000,000</td>
<td>20,000,000</td>
<td>11,000,000</td>
</tr>
<tr>
<td>Preferred Dividends</td>
<td>1,000,000</td>
<td>0</td>
<td>600,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Common Shares</td>
<td>5,000,000</td>
<td>8,000,000</td>
<td>3,000,000</td>
<td>7,000,000</td>
</tr>
</tbody>
</table>

a. Using the information given in the above table, construct income statements for each company and the industry average. Assume that each company faces a tax rate of 35%.

b. Calculate the break-even points and the degrees of operating, financial, and combined leverage for each company and the industry average.

c. Compare the companies to each other and the industry average. What conclusions can you draw about each operation?

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Internet Exercise

1. Following the instructions from Internet Exercise 2 in Chapter 5, get the income statements for the company of your choice for the past three years from MSN Money. Now repeat the analysis from Problem 2. What differences do you note between the leverage measures for your company and Kroger?
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