Basics of Cost-Volume-Profit Analysis

Contribution Margin (CM) is the amount remaining from sales revenue after variable expenses have been deducted.

CM is used first to cover fixed expenses. Any remaining CM contributes to net operating income.
Learning Objective

LO1
To explain how changes in activity affect contribution margin and net operating income.

The Contribution Approach

Sales, variable expenses, and contribution margin can also be expressed on a per unit basis. If Racing sells an additional bicycle, $200 additional CM will be generated to cover fixed expenses and profit.

<table>
<thead>
<tr>
<th>Sales (10 bicycles)</th>
<th>$2,000</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less: Variable expenses</td>
<td>$1,000</td>
<td>100</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$1,000</td>
<td>100</td>
</tr>
<tr>
<td>Less: Fixed expenses</td>
<td>$500</td>
<td></td>
</tr>
<tr>
<td>Net income</td>
<td>$500</td>
<td></td>
</tr>
</tbody>
</table>

Each month, Racing must generate at least $80,000 in total CM to break even.

<table>
<thead>
<tr>
<th>Sales (100 bicycles)</th>
<th>$100,000</th>
<th>1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less: Variable expenses</td>
<td>$50,000</td>
<td>500</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$50,000</td>
<td>500</td>
</tr>
<tr>
<td>Less: Fixed expenses</td>
<td>$50,000</td>
<td>500</td>
</tr>
<tr>
<td>Net income</td>
<td>$0</td>
<td></td>
</tr>
</tbody>
</table>
The Contribution Approach

If Racing sells 400 units in a month, it will be operating at the **break-even point**.

If Racing sells one more bike (401 bikes), net operating income will increase by **$200**.

We do not need to prepare an income statement to estimate profits at a particular sales volume. Simply multiply the number of units sold above break-even by the contribution margin per unit.

If Racing sells 430 bikes, its net income will be **$6,000**.
Learning Objective

LO2

To prepare and interpret a cost-volume-profit (CVP) graph.

CVP Relationships in Graphic Form

The relationship among revenue, cost, profit and volume can be expressed graphically by preparing a CVP graph. Racing developed contribution margin income statements at 300, 400, and 500 units sold. We will use this information to prepare the CVP graph.

<table>
<thead>
<tr>
<th>Sales</th>
<th>Income 300 units</th>
<th>Income 400 units</th>
<th>Income 500 units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$150,000</td>
<td>$200,000</td>
<td>$250,000</td>
</tr>
<tr>
<td>Less: variable expenses</td>
<td>$90,000</td>
<td>$120,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$60,000</td>
<td>$80,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Less: fixed expenses</td>
<td>$80,000</td>
<td>$80,000</td>
<td>$80,000</td>
</tr>
<tr>
<td>Net operating income</td>
<td>$20,000</td>
<td>$20,000</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

CVP Graph

In a CVP graph, unit volume is usually represented on the horizontal (X) axis and dollars on the vertical (Y) axis.
Learning Objective

LO3

To use the contribution margin ratio (CM ratio) to compute changes in contribution margin and net operating income resulting from changes in sales volume.

Contribution Margin Ratio

The contribution margin ratio is:

\[ \text{CM Ratio} = \frac{\text{Total CM}}{\text{Total sales}} \]

For Racing Bicycle Company the ratio is:

\[ \frac{\$80,000}{\$200,000} = 40\% \]

Each $1.00 increase in sales results in a total contribution margin increase of 40¢.
Contribution Margin Ratio

Or, in terms of units, the contribution margin ratio is:

\[ \text{CM Ratio} = \frac{\text{Unit CM}}{\text{Unit selling price}} \]

For Racing Bicycle Company the ratio is:

\[ \frac{\$200}{\$500} = 40\% \]

<table>
<thead>
<tr>
<th>400 Bikes</th>
<th>500 Bikes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$200,000</td>
</tr>
<tr>
<td>Less: variable expenses</td>
<td>$120,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$80,000</td>
</tr>
<tr>
<td>Less: fixed expenses</td>
<td>$80,000</td>
</tr>
<tr>
<td>Net operating income</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

A $50,000 increase in sales revenue results in a $20,000 increase in CM. ($50,000 \times 40\% = $20,000)

Quick Check

Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average, 2,100 cups are sold each month. What is the CM Ratio for Coffee Klatch?

a. 1.319  
b. 0.758  
c. 0.242  
d. 4.139
Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average, 2,100 cups are sold each month. What is the CM Ratio for Coffee Klatch?

\[ \text{CM Ratio} = \frac{\text{Unit contribution margin}}{\text{Unit selling price}} \]

\[ \frac{($1.49 - $0.36)}{$1.49} \]

\[ = \frac{$1.13}{$1.49} \]

\[ = 0.758 \]

a. 1.319  
b. 0.758  
c. 0.242  
d. 4.139

Learning Objective

To show the effects on contribution margin of changes in variable costs, fixed costs, selling price, and volume.

Changes in Fixed Costs and Sales Volume

What is the profit impact if Racing can increase unit sales from 500 to 540 by increasing the monthly advertising budget by $10,000?
### Changes in Fixed Costs and Sales Volume

**The Shortcut Solution**

<table>
<thead>
<tr>
<th></th>
<th>Current Sales</th>
<th>Projected Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales revenue</td>
<td>$270,000</td>
<td>$275,000</td>
</tr>
<tr>
<td>Less: Variables expenses</td>
<td>$100,000</td>
<td>$102,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$170,000</td>
<td>$173,000</td>
</tr>
<tr>
<td>Less: Fixed expenses</td>
<td>$80,000</td>
<td>$80,000</td>
</tr>
<tr>
<td>Net income</td>
<td>$90,000</td>
<td>$93,000</td>
</tr>
</tbody>
</table>

Sales increased by $20,000, but net operating income decreased by $2,000.

---

### Change in Variable Costs and Sales Volume

What is the profit impact if Racing can use higher quality raw materials, thus, increasing variable costs per unit by $10, to generate an increase in unit sales from 500 to 580?
Change in Variable Costs and Sales Volume

\[ 580 \text{ units} \times 310 \text{ variable cost/unit} = 179,800 \]

Sales increase by $40,000, and net operating income increases by $10,200.

Change in Fixed Cost, Sales Price and Volume

What is the profit impact if Racing (1) cuts its selling price $20 per unit, (2) increases its advertising budget by $15,000 per month, and (3) increases unit sales from 500 to 650 units per month?

Sales increase by $62,000, fixed costs increase by $15,000, and net operating income increases by $2,000.
Change in Variable Cost, Fixed Cost and Sales Volume

What is the profit impact if Racing (1) pays a $15 sales commission per bike sold, instead of paying salespersons flat salaries that currently total $6,000 per month, and (2) increases unit sales from 500 to 575 bikes?

Change in Variable Cost, Fixed Cost and Sales Volume

<table>
<thead>
<tr>
<th></th>
<th>Current Sales</th>
<th>Projected Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales revenue</td>
<td>$270,000</td>
<td>$297,000</td>
</tr>
<tr>
<td>Less: Variable expenses</td>
<td>150,000</td>
<td>161,250</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>120,000</td>
<td>135,750</td>
</tr>
<tr>
<td>Less: Fixed expenses</td>
<td>100,000</td>
<td>110,000</td>
</tr>
<tr>
<td>Net income</td>
<td>$ 20,000</td>
<td>$ 12,375</td>
</tr>
</tbody>
</table>

Increase in CM (75 units X $85) $6,375
Reduced fixed costs 6,000
Increase in net operating income $12,375

Sales increase by $37,500, variable costs increase by $31,125, but fixed expenses decrease by $6,000.

Change in Regular Sales Price

If Racing has an opportunity to sell 150 bikes to a wholesaler without disturbing sales to other customers or fixed expenses, what price would it quote to the wholesaler if it wants to increase monthly profits by $3,000?
Change in Regular Sales Price

\[
\begin{align*}
\text{Variable cost per bike} &= \frac{\$3,000}{150 \text{ bikes}} = \$20 \text{ per bike} \\
\text{Selling price required} &= \frac{\$3,000}{150 \text{ bikes}} = \$20 \text{ per bike} \\
\end{align*}
\]

\[
\begin{align*}
150 \text{ bikes} \times \$320 \text{ per bike} &= \$48,000 \\
\text{Total variable costs} &= \$45,000 \\
\text{Increase in net income} &= \$3,000 \\
\end{align*}
\]

Learning Objective

**LO5**

To compute the breakeven point in unit sales and dollar sales.

Break-Even Analysis

Break-even analysis can be approached in two ways:
1. Equation method
2. Contribution margin method
Equation Method

Profits = (Sales – Variable expenses) – Fixed expenses

OR

Sales = Variable expenses + Fixed expenses + Profits

At the break-even point, profits equal zero

Break-Even Analysis

Here is the information from Racing Bicycle Company:

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Per Unit</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales (500 bikes)</td>
<td>$250,000</td>
<td>$500</td>
<td>100%</td>
</tr>
<tr>
<td>Less: variable expenses</td>
<td>$150,000</td>
<td>$300</td>
<td>60%</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$100,000</td>
<td>$200</td>
<td>40%</td>
</tr>
<tr>
<td>Less: fixed expenses</td>
<td>$80,000</td>
<td>$160</td>
<td></td>
</tr>
<tr>
<td>Net operating income</td>
<td>$20,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Equation Method

We calculate the break-even point as follows:

Sales = Variable expenses + Fixed expenses + Profits

$500Q = $300Q + $80,000 + $0

Where:

Q = Number of bikes sold
$500 = Unit selling price
$300 = Unit variable expense
$80,000 = Total fixed expense
Equation Method

We calculate the break-even point as follows:

\[
\begin{align*}
\$500Q &= \$300Q + \$80,000 + \$0 \\
\$200Q &= \$80,000 \\
Q &= \frac{\$80,000}{\$200\text{ per bike}} \\
Q &= 400 \text{ bikes}
\end{align*}
\]

We calculate the break-even point as follows:

\[
\begin{align*}
\text{Sales} &= \text{Variable expenses} + \text{Fixed expenses} + \text{Profits} \\
\$500Q &= \$300Q + \$80,000 + \$0 \\
\$200Q &= \$80,000 \\
Q &= \frac{\$80,000}{\$200\text{ per bike}} \\
Q &= 400 \text{ bikes}
\end{align*}
\]

The equation can be modified to calculate the break-even point in sales dollars.

\[
\begin{align*}
\text{Sales} &= \text{Variable expenses} + \text{Fixed expenses} + \text{Profits} \\
X &= 0.60X + \$80,000 + \$0 \\
\text{Where:} \\
X &= \text{Total sales dollars} \\
0.60 &= \text{Variable expenses as a % of sales} \\
\$80,000 &= \text{Total fixed expenses}
\end{align*}
\]

The equation can be modified to calculate the break-even point in sales dollars.

\[
\begin{align*}
\text{Sales} &= \text{Variable expenses} + \text{Fixed expenses} + \text{Profits} \\
X &= 0.60X + \$80,000 + \$0 \\
0.40X &= \$80,000 \\
X &= \frac{\$80,000}{0.40} \\
X &= \$200,000
\end{align*}
\]
### Contribution Margin Method

The contribution margin method has two key equations.

\[
\text{Break-even point in units sold} = \frac{\text{Fixed expenses}}{\text{Unit contribution margin}}
\]

\[
\text{Break-even point in total sales dollars} = \frac{\text{Fixed expenses}}{\text{CM ratio}}
\]

### Contribution Margin Method

Let's use the contribution margin method to calculate the break-even point in total sales dollars at Racing.

\[
\text{Break-even point in total sales dollars} = \frac{\text{Fixed expenses}}{\text{CM ratio}}
\]

\[
\$80,000 \quad 40\% \quad = \quad \$200,000 \text{ break-even sales}
\]

### Quick Check ✓

Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average 2,100 cups are sold each month. What is the break-even sales in units?

- a. 872 cups
- b. 3,611 cups
- c. 1,200 cups
- d. 1,150 cups
Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average 2,100 cups are sold each month. What is the break-even sales in units?

a. 872 cups  
b. 3,611 cups  
c. 1,200 cups  
d. 1,150 cups  

**Quick Check**

\[
\text{Break-even} = \frac{\text{Fixed expenses}}{\text{Unit CM}} = \frac{$1,300}{$1.49 - $0.36} = \frac{$1,300}{$1.13/cup} = 1,150 \text{ cups}
\]

**Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average 2,100 cups are sold each month. What is the break-even sales in dollars?**

a. $1,300  
b. $1,715  
c. $1,788  
d. $3,129  

**Quick Check**

\[
\text{Break-even sales} = \frac{\text{Fixed expenses}}{\text{CM Ratio}} = \frac{$1,300}{0.758} = $1,715
\]
Learning Objective

LO6

To determine the level of sales needed to achieve a desired target profit.

Target Profit Analysis

The equation and contribution margin methods can be used to determine the sales volume needed to achieve a target profit.

Suppose Racing Bicycle Company wants to know how many bikes must be sold to earn a profit of $100,000.

The CVP Equation Method

Sales = Variable expenses + Fixed expenses + Profits

$500Q = $300Q + $80,000 + $100,000

$200Q = $180,000

Q = 900 bikes
The Contribution Margin Approach

The contribution margin method can be used to determine that 900 bikes must be sold to earn the target profit of $100,000.

\[
\text{Unit sales to attain the target profit} = \frac{\text{Fixed expenses + Target profit}}{\text{Unit contribution margin}}
\]

\[
\frac{\$80,000 + \$100,000}{\$200/\text{bike}} = 900 \text{ bikes}
\]

Quick Check

Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. How many cups of coffee would have to be sold to attain target profits of $2,500 per month?

\[
\text{Unit sales to attain target profit} = \frac{\text{Fixed expenses + Target profit}}{\text{Unit CM}}
\]

\[
\frac{\$1,300 + \$2,500}{\$1.49 - \$0.36} = 3,363 \text{ cups}
\]

a. 3,363 cups
b. 2,212 cups
c. 1,150 cups
d. 4,200 cups
Learning Objective

**LO7**

To compute the margin of safety and explain its significance.

---

The Margin of Safety

The margin of safety is the excess of budgeted (or actual) sales over the break-even volume of sales.

\[
\text{Margin of safety} = \text{Total sales} - \text{Break-even sales}
\]

Let's look at Racing Bicycle Company and determine the margin of safety.

---

<table>
<thead>
<tr>
<th>Sales</th>
<th>400 units</th>
<th>500 units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Break-even sales</td>
<td>$200,000</td>
<td>$250,000</td>
</tr>
<tr>
<td>Less: variable expenses</td>
<td>$120,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$80,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Less: fixed expenses</td>
<td>$80,000</td>
<td>$80,000</td>
</tr>
<tr>
<td>Net operating income</td>
<td>$0</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

---
The Margin of Safety

The margin of safety can be expressed as **20%** of sales.

\[
\frac{\$50,000}{\$250,000} = 20\%
\]

<table>
<thead>
<tr>
<th>Break-even sales</th>
<th>Actual sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$200,000</td>
</tr>
<tr>
<td>Less: variable expenses</td>
<td>$120,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$80,000</td>
</tr>
<tr>
<td>Less: fixed expenses</td>
<td>$80,000</td>
</tr>
<tr>
<td>Net operating income</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

The Margin of Safety

The margin of safety can be expressed in terms of the number of units sold. The margin of safety at Racing is $50,000, and each bike sells for $500.

\[
\text{Margin of Safety in units} = \frac{\$50,000}{\$500} = 100 \text{ bikes}
\]

Quick Check

Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average 2,100 cups are sold each month. What is the margin of safety?

a. 3,250 cups
b. 950 cups
c. 1,150 cups
d. 2,100 cups
Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average 2,100 cups are sold each month. What is the margin of safety?

a. 3,250 cups  
b. 950 cups  
c. 1,150 cups  
d. 2,100 cups

Cost Structure and Profit Stability

Cost structure refers to the relative proportion of fixed and variable costs in an organization. Managers often have some latitude in determining their organization’s cost structure.

There are advantages and disadvantages to high fixed cost (or low variable cost) and low fixed cost (or high variable cost) structures.

An advantage of a high fixed cost structure is that income will be higher in good years compared to companies with lower proportion of fixed costs.

A disadvantage of a high fixed cost structure is that income will be lower in bad years compared to companies with lower proportion of fixed costs.
Learning Objective

**LO8**

To compute the degree of operating leverage at a particular level of sales and explain how it can be used to predict changes in net operating income.

Operating Leverage

A measure of how sensitive net operating income is to percentage changes in sales.

\[
\text{Degree of operating leverage} = \frac{\text{Contribution margin}}{\text{Net operating income}}
\]

Operating Leverage

At Racing, the degree of operating leverage is 5.

<table>
<thead>
<tr>
<th>Actual sales</th>
<th>500 Bikes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$250,000</td>
</tr>
<tr>
<td>Less: variable expenses</td>
<td>$150,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$100,000</td>
</tr>
<tr>
<td>Less: fixed expenses</td>
<td>$80,000</td>
</tr>
<tr>
<td>Net income</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

\[
\frac{\$100,000}{\$20,000} = 5
\]
Operating Leverage

With an operating leverage of 5, if Racing increases its sales by 10%, net operating income would increase by 50%.

<table>
<thead>
<tr>
<th>Percent increase in sales</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of operating leverage</td>
<td>( \times 5 )</td>
</tr>
<tr>
<td>Percent increase in profits</td>
<td>50%</td>
</tr>
</tbody>
</table>

Here's the verification!

Operating Leverage

<table>
<thead>
<tr>
<th>Actual sales</th>
<th>Increased sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual sales</td>
<td>Increased sales</td>
</tr>
<tr>
<td>Sales</td>
<td>$250,000</td>
</tr>
<tr>
<td>Less variable expenses</td>
<td>$150,000</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$100,000</td>
</tr>
<tr>
<td>Less fixed expenses</td>
<td>$80,000</td>
</tr>
<tr>
<td>Net operating income</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

10% increase in sales from $250,000 to $275,000... 

...results in a 50% increase in income from $20,000 to $30,000.

Quick Check ✔

Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average 2,100 cups are sold each month on. What is the operating leverage?

a. 2.21
b. 0.45
c. 0.34
d. 2.92
Quick Check ✓

Coffee Klatch is an espresso stand in a downtown office building. The average selling price of a cup of coffee is $1.49 and the average variable expense per cup is $0.36. The average fixed expense per month is $1,300. On average 2,100 cups are sold each month. What is the operating leverage?

a. 2.21
b. 0.45
c. 0.34
d. 2.92

Quick Check ✓

At Coffee Klatch the average selling price of a cup of coffee is $1.49, the average variable expense per cup is $0.36, and the average fixed expense per month is $1,300. On average 2,100 cups are sold each month. If sales increase by 20%, by how much should net operating income increase?

a. 30.0%
b. 20.0%
c. 22.1%
d. 44.2%
<table>
<thead>
<tr>
<th>Actual sales</th>
<th>Increased sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,100 cups</td>
<td>2,520 cups</td>
</tr>
<tr>
<td>Sales</td>
<td></td>
</tr>
<tr>
<td>$ 3,129</td>
<td>$ 3,755</td>
</tr>
<tr>
<td>Less: Variable expenses</td>
<td>756</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>2,373</td>
</tr>
<tr>
<td>Less: Fixed expenses</td>
<td>1,300</td>
</tr>
<tr>
<td>Net operating income</td>
<td>$ 1,073</td>
</tr>
</tbody>
</table>

% change in sales: 20.0%
% change in net operating income: 44.2%

Structuring Sales Commissions
Companies generally compensate salespeople by paying them either a commission based on sales or a salary plus a sales commission. Commissions based on sales dollars can lead to lower profits in a company.

Let's look at an example.

Pipeline Unlimited produces two types of surfboards, the XR7 and the Turbo. The XR7 sells for $100 and generates a contribution margin per unit of $25. The Turbo sells for $150 and earns a contribution margin per unit of $18.

The sales force at Pipeline Unlimited is compensated based on sales commissions.
Structuring Sales Commissions

If you were on the sales force at Pipeline, you would push hard to sell the Turbo even though the XR7 earns a higher contribution margin per unit.

To eliminate this type of conflict, *commissions can be based on contribution margin rather than on selling price alone.*

Learning Objective

**LO9**

To compute the break-even point for a multiproduct company and explain the effects of shifts in the sales mix on contribution margin and the break-even point.

The Concept of Sales Mix

- Sales mix is the relative proportion in which a company's products are sold.
- Different products have different selling prices, cost structures, and contribution margins.

Let's assume Racing Bicycle Company sells bikes and carts and that the sales mix between the two products remains the same.
Multi-product break-even analysis

Racing Bicycle Co. provides the following information:

\[ \text{Sales mix} = \frac{265,000}{550,000} = 48.2\% \text{ (rounded)} \]

Key Assumptions of CVP Analysis

1. Selling price is constant.
2. Costs are linear.
3. In multi-product companies, the sales mix is constant.
4. In manufacturing companies, inventories do not change (units produced = units sold).