

- **Projecting Total Cost:** When predicting total cost (the dependent variable) as a function of fixed costs, variable costs, and volume (the independent variable), management's expectation is that the correlation coefficient will be somewhere between 0.00 and 1.00. As more units of a given product are produced, a reasonable expectation is that total costs will increase.

3.2.2 The Coefficient of Determination (R^2)

- **Definition:** The coefficient of determination (R^2) is the proportion of the total variation in the dependent variable (y) explained by the independent variable (x). Its value lies between zero and one.
- **Interpretation:** The higher the R^2 , the greater the proportion of the total variation in y that is explained by the variation in x . That is, the higher the R^2 , the better the fit of the regression line.

Illustration 1 Coefficient of Determination

Based on looking at five years of data on fixed costs and variable costs per unit, Raxan Inc. determines that its fixed and variable costs in the next year will be \$16,000 and \$4.50 per unit, respectively. Raxan has determined that the correlation coefficient between the independent and dependent variable is equal to 0.90. The R^2 for the regression equation y (total costs) = $\$16,000 + \$4.50x$, with x being volume, is equal to 0.81. An R^2 of 0.81 means that 81 percent of the change in total cost during a period can be attributed to changes in volume.

4 High-Low Method

The *high-low method* is a simple technique that is used to estimate the fixed and variable portions of cost, usually production costs.

4.1 Procedures

4.1.1 Gather Data

Compare the high and low volumes and costs (ignoring any obvious aberrations). Outliers, which are unusually high or low volumes, are eliminated.

4.1.2 Analyze Data

- Divide the difference between the high and low dollar total costs by the difference in high and low volumes to obtain the variable cost per unit.
- Use either the high volume or the low volume to calculate the variable costs by multiplying the volume times the variable cost per unit.
- Subtract the total calculated variable cost from total costs to obtain fixed costs.

4.1.3 Formulate Results

The result enables preparation of a flexible/performance budget by identifying total fixed costs and variable costs per unit. This may be used to estimate total costs at any volume.

4.2 Flexible Budget Formula

The result of the high-low method is called a total cost formula and, sometimes, a flexible budget formula (or equation).

4.2.1 Flexible Budget

A *flexible budget* is a series of budgets that are prepared for a range of activity levels rather than a single activity (in which variable costs are adjusted to the level of activity and fixed costs are held constant).

4.2.2 Formula

This formula defines total costs as equal to the fixed costs plus the variable costs per unit times the units. The flexible budget formula is then used to estimate total cost at any volume.

$$\text{Total cost} = \text{Fixed cost} + \left[\frac{\text{Variable cost}}{\text{per unit}} \times \text{Number of units} \right]$$

Illustration 2 High-Low Method

Period	Units/Volume	Cost
January	1,200	\$9,000
February	1,000	8,450
March	1,050	8,600
April	1,130	8,750
May	1,400	9,550
June	1,200	9,000
High	1,400	9,550
Low	(1,000)	(8,450)
Difference between high and low	<u>400</u>	<u>\$1,100</u>

Variable cost per unit = \$1,100 / 400 units = \$2.75 per unit

Using either the high or the low will produce the same total fixed-cost result:

	High	Or:	Low
Units	<u>1,400</u>		<u>1,000</u>
Total cost of units	\$9,550		\$8,450
Variable costs @ \$2.75 per unit	(3,850)		(2,750)
Total fixed costs	<u>\$5,700</u>	=	<u>\$5,700</u>

Total costs = Fixed costs + [Variable costs per unit × Number of units]

Total costs = \$5,700 + [\$2.75 × Number of units]

5 Learning Curve

Learning curve analysis is based on the premise that as workers become more familiar with a specific task, the per-unit labor hours will decline as experience is gained and production becomes more efficient.

- This analysis is used to set standards and to project costs, as variable costs per unit should decline until a steady-state period is achieved. Once steady state occurs, labor hours per unit will remain constant.
- In order for learning curve analysis to be applied, the activity itself must be repetitive in nature, involve intense labor, and have little to no labor force turnover or breaks in production.
- The calculation begins with the first unit/batch. As cumulative production doubles (from one unit to two units, to four units, to eight units, etc.), cumulative average time per unit falls to a fixed percentage (the learning curve rate) of the previous average time.

Example 3

Learning Curve

Facts: It takes the Jones Production Company 50 hours to produce the first unit of its only product.

Required: Assuming a 70 percent learning curve, estimate the average time and total to produce 2 units, 4 units, and 8 units.

Solution:

2 Units

What is the average time it takes Jones to produce 2 units?

$$\text{Average time (2 units)} = 50 \text{ hours} \times 0.70 = 35 \text{ hours}$$

What is the total time it takes Jones to produce 2 units?

$$\text{Total time (2 units)} = 35 \text{ hours} \times 2 \text{ units} = 70 \text{ hours}$$

4 Units

What is the average time it takes Jones to produce 4 units?

$$\text{Average time (4 units)} = 35 \text{ hours} \times 0.70 = 24.5 \text{ hours}$$

What is the total time it takes Jones to produce 4 units?

$$\text{Total time (4 units)} = 24.5 \text{ hours} \times 4 \text{ units} = 98 \text{ hours}$$

8 Units

What is the average time it takes Jones to produce 8 units?

$$\text{Average time (8 units)} = 24.5 \text{ hours} \times 0.70 = 17.15 \text{ hours}$$

What is the total time it takes Jones to produce 8 units?

$$\text{Total time (8 units)} = 17.15 \text{ hours} \times 8 \text{ units} = 137.2 \text{ hours}$$

Example 4**Learning Curve**

Facts: It takes the Jones Production Company 50 hours to produce the first unit, and 70 total hours to produce the first two units.

Required: Calculate the learning curve rate.

Solution: 70%. $(70 \text{ total hours for 2 units}) / (50 \text{ hours} \times 2 \text{ units}) = 70/100 = 70\%$.

Example 5**Learning Curve**

Facts: It takes the Jones Production Company 50 hours to produce the first unit, and 35 hours, on average, to produce each of the first two units.

Required: Calculate the learning curve rate.

Solution: 70%. $(35 \text{ hours on average for each unit}) / (50 \text{ hours for the first unit})$.

Question 1

CPA-07088

The coefficient of determination, R^2 , in a multiple regression equation is the:

- a. Percentage of variation in the independent variables explained by the variation in the dependent variable.
- b. Percentage of variation in the dependent variable explained by the variation in the independent variables.
- c. Measure of the proximity of actual data points to the estimated data points.
- d. Coefficient of the independent variable divided by the standard error of regression coefficient.

[Answer](#) [Explanation](#)**Question 2**

CPA-04642

Trijonis Company estimated its material handling costs at two activity levels, as follows:

Kilos Handled	Cost
80,000	\$160,000
60,000	\$132,000

What is Trijonus' estimated cost for handling 75,000 kilos?

- a. \$150,000
- b. \$153,000
- c. \$157,500
- d. \$165,000

[Answer](#) [Explanation](#)

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1 Cost-Volume-Profit (CVP) Analysis



Cost-volume-profit (CVP) analysis is used by managers to forecast profits at different levels of sales and production volume. The point at which revenues equal total costs is called the breakeven point. Cost-volume-profit analysis is synonymous with breakeven analysis.

1.1 Assumptions

1.1.1 General Assumptions

- All costs can be separated into either variable or fixed costs, depending on the behavior of the cost.
- Volume is the only relevant factor affecting cost.
- All costs behave in a linear fashion in relation to production volume.
- Cost behaviors are anticipated to remain constant over the relevant range of production volume because there is an assumption that the efficiency of production does not change.
- Costs show greater variability over time. The longer the time period, the greater the percentage of variable costs. The shorter the time period, the greater the percentage of fixed costs.

1.1.2 Use of Single Product

Although cost-volume-profit analysis can be performed for more than one product, in its simplest form, the model assumes that the product mix remains constant.

1.1.3 Contribution Approach (Direct Costing) Is Used Rather Than Absorption Approach

The contribution approach to the income statement is used for breakeven analysis. Identifying each element of cost as fixed or variable defines its relationship to volume and to the computation of breakeven.

1.1.4 Selling Prices Remain Unchanged

The volume of transactions produces a uniform contribution margin per unit and a predictable projected contribution margin based on volume.

2 Absorption Approach vs. Contribution Approach

2.1 Absorption Approach

The *absorption approach*, which is required for financial reporting under U.S. GAAP, does not segregate fixed and variable costs.

The equation for the absorption approach follows:

Revenue
<u>Less: cost of goods sold</u>
Gross margin
<u>Less: operating expenses</u>
Net income
=====

2.2 Contribution Approach

The *contribution approach* to the income statement uses *variable costing* (also called *direct costing*). Although it does not represent generally accepted accounting principles, the contribution approach is extremely useful for internal decision making.

The equation for the contribution approach follows:

Revenue
<u>Less: variable costs</u>
Contribution margin
<u>Less: fixed costs</u>
Net income
=====



Pass Key

Variable costs include direct labor, direct material, variable manufacturing overhead, shipping and packaging, and variable selling expenses.

Fixed costs include fixed overhead, fixed selling, and most general and administrative expenses

- **Total or Per Unit:** Revenue, variable costs, and contribution margin may be expressed in total and on a per-unit basis.
- **Unit Contribution Margin:** *Unit contribution margin* is the unit sales price minus the unit variable cost.
- **Contribution Margin Ratio:** The *contribution margin ratio* is the contribution margin expressed as a percentage of revenue.



Pass Key

3

The contribution ratio formula is expressed as follows:

$$\text{Contribution margin ratio} = \text{Contribution margin} \div \text{Revenue}$$

2.3 Absorption Approach vs. Contribution Approach

The difference between the *absorption approach* and the *contribution approach* is the treatment of fixed factory overhead. Selling, general, and administrative expenses are period costs under both methods.

2.3.1 Treatment of Fixed Factory Overhead

- **Absorption Approach—Product Cost:** Under the *absorption approach* (absorption costing), all fixed factory overhead is treated as a product cost and is included in inventory values. Cost of goods sold includes both fixed costs and variable costs.
- **Contribution Approach—Period Cost:** Under the *contribution approach* (variable costing), all fixed factory overhead is treated as a period cost and is expensed in the period incurred. Inventory values include only the *variable manufacturing costs*, so cost of goods sold includes only variable manufacturing costs.

2.3.2 Treatment of Selling, General, and Administrative Expenses

Selling, general, and administrative expenses are *period costs* used in the determination of net income under both methods.

- **Absorption Approach:** Under the *absorption approach*, both variable and fixed selling, general, and administrative expenses are part of operating expenses and are reported on the income statement separately from cost of goods sold.
- **Contribution Approach:** Under the *contribution approach*, the variable selling, general, and administrative expenses are part of the total variable costs for the contribution margin calculation.



Pass Key

Absorption Costing	Variable (Direct) Costing
Product costs <ul style="list-style-type: none"> • Direct materials • Direct labor • Variable manufacturing overhead • Fixed manufacturing overhead 	Product costs <ul style="list-style-type: none"> • Direct materials • Direct labor • Variable manufacturing overhead
Period costs <ul style="list-style-type: none"> • Variable and fixed selling, general, and administrative expenses. 	Period costs <ul style="list-style-type: none"> • Fixed manufacturing overhead • Variable and fixed selling, general, and administrative expenses.

2.3.3 Gross Margin vs. Contribution Margin

The general income statement formats of both methods are presented below:

Gross Margin <i>Absorption (Full Cost) Method</i>		Contribution Margin <i>Variable (Direct) Cost Method</i>	
Sales	\$XX	Sales	\$XX
Less: cost of goods sold	<u>(X)</u>	Less: variable cost of goods sold (excludes fixed overhead)	(X)
Gross margin*	XX	Less: variable selling and administrative expense	<u>(X)</u>
Less: variable selling and administrative expenses	(X)	Contribution margin	\$XX
Fixed selling and administrative expenses	<u>(X)</u>	Less: fixed expenses	
Operating income	<u><u>\$XX</u></u>	Fixed manufacturing overhead	(X)
		Fixed selling and administrative expenses	<u>(X)</u>
		Operating income	<u><u>\$XX</u></u>

*Gross profit margin may also be stated as a percentage, which is calculated as gross margin (or profit) divided by net sales.

2.4 Effect on Income

If all production is sold every period, both methods produce the same operating income figures. However, if the number of units sold is more or less than the number of units produced, the operating income figures will be different.

2.4.1 Production Greater Than Sales

If units produced exceed units sold, then some units are added to ending inventory and income is higher under absorption costing than under variable costing.

- Under absorption costing, a portion of the fixed manufacturing overhead is included with each unit in ending inventory.
- Under variable (direct) costing, all fixed manufacturing overhead is considered a period cost and is expensed during the period.

2.4.2 Sales Greater Than Production

If units sold exceed units produced, then ending inventory is less than beginning inventory and income is lower under absorption costing than under variable costing.

- Under absorption costing, the fixed manufacturing overhead carried over from a previous period as a part of beginning inventory is charged to cost of sales.
- Under variable (direct) costing, those fixed costs were charged to income in a prior period (when they were incurred).



Pass Key

Examiners frequently ask about the difference between variable costing net income and absorption costing net income. Follow the simple steps below to compute the difference:

- **Step 1:** Compute fixed cost per unit (Fixed manufacturing overhead/Units produced)
- **Step 2:** Compute the change in income (Change in inventory units × Fixed cost per unit)
- **Step 3:** Determine the impact of the change in income:

No change in inventory: Absorption net income = Variable net income

Increase in inventory: Absorption net income > Variable net income

Decrease in inventory: Absorption net income < Variable net income

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2.5 Benefits and Limitations of Each Method

2.5.1 Absorption (GAAP) Costing

■ Benefits

- *Absorption costing* is GAAP.
- The Internal Revenue Service requires the use of the absorption method for financial reporting.

■ Limitations

- The level of inventory affects net income because fixed costs are a component of product cost.
- The net income reported under the absorption method is less reliable (especially for use in performance evaluations) than under the variable method because the cost of the product includes fixed costs and, therefore, the level of inventory affects net income.

2.5.2 Variable (Direct) Costing

■ Benefits

- Variable and fixed costs are separated and can be easily traced to and controlled by management.
- The net income reported under the contribution income statement is more reliable (especially for use in performance evaluations) than under the absorption method because the cost of the product does not include fixed costs and, therefore, the level of inventory does not affect net income.
- Variable costing isolates the contribution margins in financial statements to aid in decision making (the contribution margin is defined as sales price less all variable costs, including variable sales and administrative costs, and breakeven analysis is often based on contribution margins).

■ Limitations

- Variable costing is not GAAP.
- The Internal Revenue Service does not allow the use of the variable cost method for financial reporting.

Illustration 1 Absorption vs. Variable Costing

Costs	Total Costs	Absorption Method Product Cost	Contribution Method Product Cost
Direct materials	\$1.00	\$1.00	\$1.00
Labor			
Direct	4.00	4.00	4.00
Indirect (fixed building maintenance)	0.50	0.50	-
Overhead			
Variable	1.50	1.50	1.50
Fixed	2.00	2.00	-
Commissions to salesman	1.00	-	-
Freight out	<u>0.80</u>	<u>-</u>	<u>-</u>
Total	<u>\$10.80</u>	<u>\$9.00</u>	<u>\$6.50</u>

6

3 Breakeven Analysis

Breakeven analysis determines the sales required (in dollars or units) to achieve zero profit or loss from operations. In determining the amount in revenues required to break even, management must estimate both fixed costs overall and variable costs on a per-unit basis.

Example 1**Breakeven Analysis**

Facts: The following information is applicable to Green Grass Industries and will be used for all of the examples in the next several sections:

- Sales price per unit of \$125 and variable costs per unit of \$50. The contribution margin per unit is \$75 (\$125 – \$50) and the contribution margin ratio is 60% (\$75/\$125).
- Fixed costs of \$150,000.
- Desired pretax profit of \$60,000, a tax rate of 40%, and desired after-tax profit of \$36,000.
- Potential unit sales of 2,500 at the current sales price, and a maximum of 3,000 in unit sales to reach market saturation.

3.1 Breakeven Point in Units

The contribution approach to the income statement makes it easy to calculate the breakeven point in either units or sales dollars.

The breakeven point in units can be determined by dividing the unit contribution margin into the total fixed costs:

$$\text{Breakeven point in units} = \frac{\text{Total fixed costs}}{\text{Contribution margin per unit}}$$

Example 1

Breakeven Analysis (continued)

Facts: The same as the first part of Example 1.

Required: Calculate Green Grass' breakeven point in units.

Solution: Breakeven point in units = $\$150,000 / \$75 = 2,000$ units

The company will need to sell 2,000 units in order to recover its variable costs of \$75 per unit and its total fixed costs of \$150,000.

3.2 Breakeven Point in Dollars

There are two approaches to computing breakeven in sales dollars.

- 1. Contribution Margin per Unit:** Compute the breakeven point in units using the contribution margin per unit, and then multiply those breakeven units by the selling price per unit:

$$\text{Breakeven point in dollars} = \text{Unit price} \times \text{Breakeven point (in units)}$$

Example 1

Breakeven Analysis (continued)

Facts: The same as the first part of Example 1.

Required: Calculate Green Grass' breakeven point in dollars, using breakeven units.

Solution: Breakeven point in dollars = $\$125 \times 2,000$ units = \$250,000

The company will need sales of \$250,000 in order to cover total variable costs of \$100,000 ($2,000$ units \times \$50 per unit) and total fixed costs of \$150,000.

2. **Contribution Margin Ratio:** Divide total fixed costs by the contribution margin ratio (i.e., the contribution margin as a percentage of revenue per unit or unit price):

$$\text{Breakeven point in dollars} = \frac{\text{Total fixed costs}}{\text{Contribution margin ratio}}$$

Example 1**Breakeven Analysis (continued)**

Facts: The same as the first part of Example 1.

Required: Calculate Green Grass' breakeven point in dollars, using the contribution margin ratio.

Solution: Breakeven point in dollars = $\$150,000 / 60\% = \$250,000$

3.3 Required Sales Volume for Target Profit

Breakeven analysis can be extended to calculate the unit sales or sales dollars required to produce a targeted profit. Although profit figures are most relevant on an after-tax basis, the amount that must be added to the breakeven computation in order to calculate the required sales dollars/units must be a before-tax profit amount. This is done for the purposes of maintaining consistency with the pretax sales and pretax cost figures used in the calculation.

3.3.1 Sales Units Needed to Obtain a Desired Profit

The formula is modified to treat the desired net income before taxes as another fixed cost.

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$$\text{Sales (units)} = (\text{Fixed cost} + \text{Pretax profit}) / \text{Contribution margin per unit}$$

Example 1**Breakeven Analysis (continued)**

Facts: The same as the first part of Example 1.

Required: Calculate Green Grass' unit sales needed in order to achieve its desired pretax profit of \$60,000.

Solution: Sales (units) = $(\$150,000 + \$60,000) / \$75 = 2,800$ units

Green Grass must sell 2,800 units in order to cover its fixed and variable costs and to achieve its desired pretax profit of \$60,000.

3.3.2 Sales Dollars Needed to Obtain a Desired Profit

There are two approaches to computing the sales dollars needed to achieve a desired profit.

1. Summation of Total Costs and Profits

$$\text{Sales dollars} = \text{Variable costs} + \text{Fixed costs} + \text{Pretax profit}$$

Example 1

Breakeven Analysis (continued)

Facts: The same as the first part of Example 1.

Required: Calculate Green Grass' sales (in dollars) needed in order to achieve its desired pretax profit.

Solution: Total variable costs = 2,800 units × \$50 per unit = \$140,000

$$\text{Sales (dollars)} = \$140,000 + \$150,000 + \$60,000 = \$350,000$$

Green Grass must have sales of \$350,000 in order to cover its variable and fixed costs and achieve its desired \$60,000 pretax profit.

2. Contribution Margin Ratio

$$\text{Sales} = \frac{\text{Fixed cost} + \text{Pretax profit}}{\text{Contribution margin ratio}}$$

Example 1

Breakeven Analysis (continued)

Facts: The same as the first part of Example 1.

Required: Calculate Green Grass' sales (in dollars) needed in order to achieve its desired pretax profit.

Solution: Sales (dollars) = (\$150,000 + \$60,000)/60% = \$350,000

3.4 Predicting Profits Based on Volume

After breakeven has been achieved, each additional unit sold will increase net income by the amount of the contribution margin per unit.

Example 1

Break-even Analysis (continued)

Facts: The same as the first part of Example 1.

Required: Calculate Green Grass' profit if the company sells 2,500 units.

Solution: Profit = Units above the breakeven point × Contribution margin per unit
 $= 500 \times \$75 = \$37,500$.

The breakeven point calculated earlier was 2,000 units. For every unit sold above 2,000, the company will book a \$75 profit. If it sells 2,500 units, that is 500 additional units above breakeven; those 500 units will provide a total profit of \$37,500.

3.5 Setting Selling Prices Based on Assumed Volume

This analysis also may be used to derive a per-unit selling price necessary to cover all costs and the desired pretax profit given a specific volume limit.

$$\text{Sale price per unit} = (\text{Fixed costs} + \text{Variable costs} + \text{Pretax profit}) / \text{Number of units sold}$$

Example 1

Break-even Analysis (continued)

Facts: The same as the first part of Example 1.

Required: Calculate Green Grass' per-unit sales price needed to produce its desired pretax profit given the market saturation level of 3,000 units.

Solution: Per-unit sales price = $[\$150,000 + (3,000 \text{ units} \times \$50 \text{ per unit}) + \$60,000] / 3,000$
 $= \$120 \text{ per unit}$.

If the company can sell 3,000 units at \$120 per unit, it will cover all fixed costs, variable costs, and the desired pretax profit.

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3.6 Margin of Safety Concepts

The margin of safety is the excess of sales over breakeven sales, and generally is expressed as either dollars or a percentage.

3.6.1 Sales Dollars

The margin of safety expressed in dollars is calculated as follows:

$$\text{Margin of safety (in dollars)} = \text{Total sales (in dollars)} - \text{Breakeven sales (in dollars)}$$

3.6.2 Percentage

The margin of safety also can be expressed as a percentage of sales, as indicated below:

$$\text{Margin of safety percentage} = \frac{\text{Margin of safety in dollars}}{\text{Total sales}}$$

3.7 Breakeven Charts

Breakeven charts graphically display the results of breakeven analysis.

Illustration 2 Breakeven Chart 1

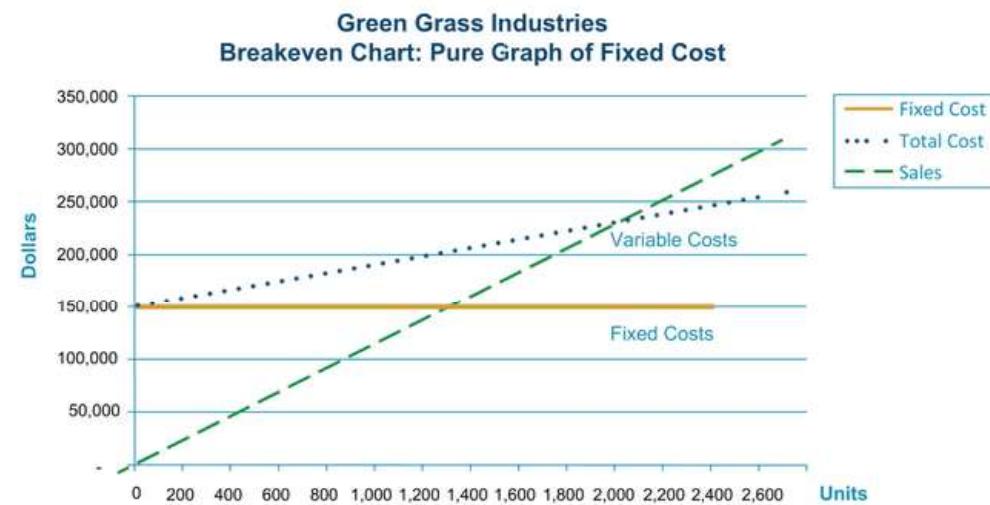
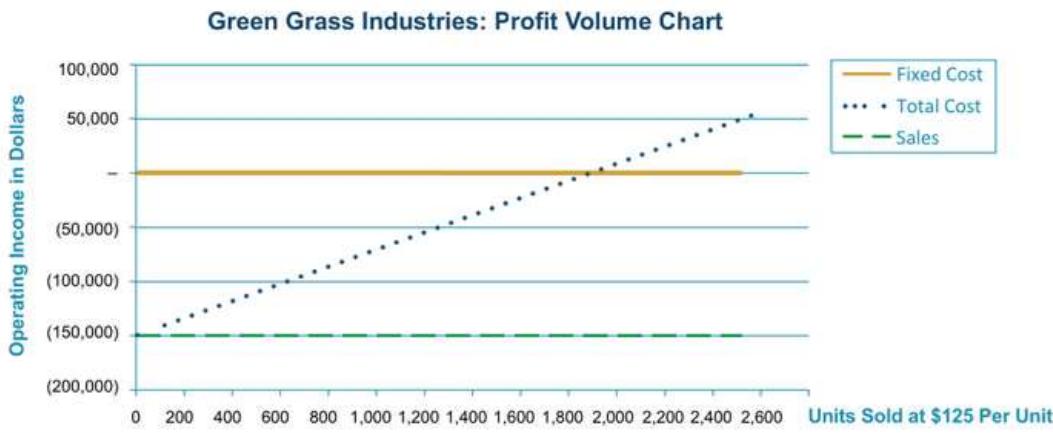


Illustration 3 Breakeven Chart 2



4 Target Costing (Used for Target Pricing)

Target costing is a technique used to establish the product cost allowed to ensure both profitability per unit and total sales volume.

4.1 Cost Determination

The concept of target costing uses the selling price of the product to determine the production costs to be allowed.

4.1.1 Market Circumstances Creating Target Costing

As competition (typically from a "cost leader") sets prices, any change in price could easily cause a customer defection. Target costing is the first step in establishing cost controls to ensure ongoing profitability.

4.1.2 Target Cost Computation

The target cost of the product is the market price minus profit calculated as follows:

$$\text{Target cost} = \text{Market price} - \text{Required profit}$$

4.2 Implications of Target Costing

If management commits to a target cost, serious measures must be employed to reduce costs. Although the mechanics are simple, the implications can be far-reaching.

4.2.1 Compromised Quality

The firm may have to sacrifice quality (by reducing costs), but this can have the effect of loss of sales.

4.2.2 Increased Marketing and Downstream Costs

Firms competing in this type of environment may incur increased downstream costs in an attempt to differentiate their products and create brand loyalty (and a competitive advantage).

4.2.3 Increased Complexity in Cost Measurement

Advanced cost management techniques may have to be employed to attain a higher productivity level.

4.2.4 Product Redesign

The product may have to be redesigned to provide for the reduction of costs throughout the life cycle of a product (referred to as the Kaizen method).

Question 1**CPA-03709**

Breakeven analysis assumes that over the relevant range:

- a. Unit revenues are nonlinear.
- b. Unit variable costs are unchanged.
- c. Total costs are unchanged.
- d. Total fixed costs are nonlinear.

Answer Explanation**Question 2****CPA-04798**

Waldo Company, which produces only one product, provides its most current month's data as follows:

Selling price per unit \$ 80

Variable costs per unit:

Direct materials 21

Direct labor 10

Variable manufacturing overhead 3

Variable selling and administrative 6

Fixed costs:

Manufacturing overhead \$76,000

Selling and administrative 58,000

Units:

Beginning inventory 0

Month's production 5,000

Number sold 4,500

Ending inventory 500

Based on the above information, what is the total contribution margin for the month under the variable costing approach?

- a. \$46,000
- b. \$180,000
- c. \$207,000
- d. \$226,000

Answer Explanation

Question 3**CPA-04815**

At the end of a company's first year of operation, 2,000 units of inventory are on hand. Variable costs are \$100 per unit, and fixed manufacturing costs are \$30 per unit. The use of absorption costing, rather than variable costing, would result in a higher net income of what amount?

- a. \$60,000
- b. \$140,000
- c. \$200,000
- d. \$260,000

Answer Explanation**Question 4****CPA-03676**

At annual sales of \$900,000, the Ebo product has the following unit sales price and costs:

Selling price per unit	\$20
Prime cost	6
<i>Manufacturing overhead:</i>	
Variable	1
Fixed	7
<i>Selling and administrative costs:</i>	
Variable	1
Fixed	<u>3</u>
	<u>18</u>
Profit	<u>\$ 2</u>

What is Ebo's breakeven point in units?

- a. 25,000 units
- b. 31,500 units
- c. 37,500 units
- d. 45,000 units

Answer Explanation



RT

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1 Ratio Analysis: An Overview

Ratios are a quick and easy way to evaluate a company's past, current, and future performance and financial standing. The results of forecasts and projections can be analyzed using ratio analysis and by looking for correlations to and variations from key financial ratios.

Many of the ratios in this module are also presented elsewhere in the text. In this section, they are defined and interpreted in the context of projections and forecasts (with these terms used interchangeably for simplicity).

Illustration 1 Gi Company Forecast

Gi Company has used its Year 1 financial results and other information on the historical performance of the company to forecast its Year 2 financial results and has prepared the following forecasted financial statements for Year 2.

The company will use ratio analysis to determine the financial implications of the forecasted results.

Gi Company Balance Sheet

	12/31/Year 2	12/31/Year 1
Current assets		
Cash and cash equivalents	\$ 50,000	\$ 35,000
Trading securities (at fair value)	75,000	65,000
Accounts receivable	300,000	390,000
Inventory (at lower of cost or market)	<u>290,000</u>	<u>275,000</u>
Total current assets	715,000	765,000
Investments available for sale (at fair value)	350,000	300,000
Fixed assets:		
Property, plant, and equipment (at cost)	1,900,000	1,800,000
Less: accumulated depreciation	<u>(180,000)</u>	<u>(150,000)</u>
	1,720,000	1,650,000
Goodwill	<u>30,000</u>	<u>35,000</u>
Total assets	<u>\$2,815,000</u>	<u>\$2,750,000</u>

(continued)

(continued)

Current liabilities:

Accounts payable	\$ 150,000	\$ 125,000
Notes payable	325,000	375,000
Accrued and other liabilities	<u>220,000</u>	<u>200,000</u>
Total current liabilities	\$ 695,000	\$ 700,000

Long-term debt

Bonds and notes payable	<u>650,000</u>	<u>700,000</u>
Total liabilities	<u>1,345,000</u>	<u>1,400,000</u>

Stockholders' equity

Common stock (100,000 shares outstanding)	500,000	500,000
Additional paid-in capital	670,000	670,000
Retained earnings	<u>300,000</u>	<u>180,000</u>
Total equity	<u>1,470,000</u>	<u>1,350,000</u>
Total liabilities and equity	<u>\$2,815,000</u>	<u>\$2,750,000</u>

Gi Company Income Statement

	Year 2 (Forecasted)	Year 1 (Actual)
Sales	\$1,800,000	\$1,700,000
Cost of goods sold	<u>(1,000,000)</u>	<u>(940,000)</u>
Gross profit	800,000	760,000
Operating expenses	(486,970)	(476,970)
Interest expense	<u>(10,000)</u>	<u>(10,300)</u>
Net income before income taxes	303,030	272,730
Income taxes (34%)	<u>(103,030)</u>	<u>(92,730)</u>
Net income after income taxes	<u>\$ 200,000</u>	<u>\$ 180,000</u>
Earnings per share	\$ 2.00	\$ 1.80
Other financial information		
Operating cash flows	\$275,000	\$265,000
Dividends for the year	\$0.80 per share	\$0 for Year 1
Market price per share	\$12	\$11

Assumptions for forecast:

Sales: A forecasted increase of 100,000 in sales from 1,700,000 to 1,800,000.

COGS: A forecasted increase of 60,000 in COGS from 940,000 to 1,000,000 due to rising inventory costs.

Operating expenses: A forecasted increase of 10,000 tied to annual wage increases.

Interest expense: A forecasted decline of 300 due to pay down of a small amount of debt.

Operating cash flows: increase of \$10,000

2 Liquidity Ratios

The focus of liquidity ratios is on the current liabilities side of a company's balance sheet, and on whether a company will have enough in current assets and other funds to pay the liabilities when they are due. Key liquidity ratios include the current ratio, quick ratio, cash ratio, operating cash flow ratio, and working capital turnover ratio.

2.1 Working Capital

$$\text{Working capital} = \text{Current assets} - \text{Current Liabilities}$$

$$\text{Year 2: } \$715,000 - \$695,000 = \$20,000$$

$$\text{Year 1: } \$765,000 - \$700,000 = \$65,000$$

2.2 Current Ratio

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$\text{Year 2} = \frac{\$715,000}{\$695,000} = 1.03$$

$$\text{Year 1} = \frac{\$765,000}{\$700,000} = 1.09$$

(Industry average = 1.50)

The ratio, and therefore Gi's ability to meet its short-term obligations, is forecasted to decrease slightly and it is low compared with the industry average. The only components (current assets and current liabilities) needed to calculate this ratio come straight from totals on the balance sheet.

- **Projection Interpretations:** All else being equal, a higher current ratio is better because it implies that more current assets are available to pay short-term liabilities. If a company expects either decreases in current assets or increases in current liabilities, this will result in a lower forecasted current ratio, which can have a potential negative effect on future funding opportunities and business operations.

2.3 Quick (Acid Test) Ratio

$$\text{Quick (acid test) ratio} = \frac{\text{Cash} + \text{Cash equivalents} + \text{Marketable securities} + \text{Receivables}}{\text{Current liabilities}}$$

$$\text{Year 2} = \frac{\$50,000 + \$75,000 + \$300,000}{\$695,000} = 0.61$$

$$\text{Year 1} = \frac{\$35,000 + \$65,000 + \$390,000}{\$700,000} = 0.70$$

(Industry average = 0.80)

4

This ratio is similar to the current ratio, except that it only includes the more liquid components of current assets such as cash, marketable securities (investments), and receivables. Gi's ratio is forecasted to decrease from Year 1 to Year 2 and the industry average of 0.80 is higher than Gi's ratio, which together indicate that Gi may have trouble meeting short-term needs.

- **Projection Interpretations:** Like the current ratio, a higher quick ratio is better because it implies that more current liquid assets are available to pay short-term liabilities. Projected shifts in dollars from liquid current assets to more illiquid assets or increases in current liabilities will result in a lower forecasted ratio.



Pass Key

When current assets are used to pay down current liabilities, the numerator and denominator of the current ratio and quick ratio decrease by the same amount. If the current ratio or quick ratio is already less than one, this will result in a lower ratio amount.

2.4 Cash Ratio

$$\text{Cash ratio} = \frac{\text{Cash} + \text{Cash equivalents} + \text{Marketable securities}}{\text{Current liabilities}}$$

$$\text{Year 2} = \frac{\$50,000 + \$75,000}{\$695,000} = 0.18$$

$$\text{Year 1} = \frac{\$35,000 + \$65,000}{\$700,000} = 0.14$$

(Industry average: 0.25)

The cash ratio is more conservative than the quick ratio, as only cash, cash equivalents and marketable securities from the current assets section of the balance sheet are used. Although there is a forecasted improvement in this ratio for Year 2, Gi is still showing a lower number than the industry average. In an extreme situation in which Gi may need to use highly liquid assets to meet its current liabilities, the company will have a more difficult time doing so than its peers.

- Projection Interpretations:** Cash and cash equivalents are the most liquid assets a company can have, so a higher ratio here implies that a company can easily cover its current obligations. A ratio that is too high may indicate that a company is holding too much in cash and not investing enough in projects that can potentially generate a high return. Projected future cash flow needs will have a large impact on this ratio.

2.5 Operating Cash Flow Ratio

$$\text{Operating cash flow ratio} = \frac{\text{Cash flow from operations}}{\text{Current liabilities}}$$

$$\text{Year 2} = \frac{\$275,000}{\$695,000} = 0.40$$

$$\text{Year 1} = \frac{\$265,000}{\$700,000} = 0.38$$

(Industry average: 0.45)

5

This ratio measures how much cash a company has generated from operating activities to cover current liabilities. Gi forecasts an increase in this ratio from 0.38 to 0.40, which means that it expects to generate more from its core operations to cover its current liabilities. Although the output is still lower than the industry average, it is moving in the right direction and presumably strong for a relatively new company going into its second year.

- Projection Interpretations:** A higher ratio is desired, as it implies that a company is generating more cash from its core activities to pay its current liabilities. Positive and sustainable cash flows from operations are crucial for the ongoing success of a company. If operating cash flows are projected to decline in the future, the company will have to look to investing and financing sources to cover the shortfall.

2.6 Working Capital Turnover

$$\text{Working capital turnover} = \frac{\text{Sales}}{\text{Average working capital}}$$

$$\begin{aligned}\text{Year 2} &= \frac{\$1,800,000}{[(\$715,000 - \$695,000) + (\$765,000 - \$700,000)] / 2} \\ &= 42.4 \text{ times}\end{aligned}$$

(Industry average: 48.5 times)

The sales amount comes from the income statement, while working capital is calculated as the difference between current assets and current liabilities. This measure is used to evaluate the money used to fund the company's operations and the sales derived from the operations. Gi's forecasted working capital turnover ratio is slightly below industry average, indicating that the company is not doing as well as its peers at converting its working capital into sales. The expectation is that as the company matures, this ratio will improve.

- **Projection Interpretations:** All else being equal, a higher working capital turnover ratio is better. Higher projected net sales in future years will cause this ratio to increase. The ratio will also increase with projected declines in current assets or increases in current liabilities. A ratio that is too high could indicate a working capital amount that is too low.

3 Activity Ratios

Activity ratios are used to assess how efficient a company is at utilizing its resources to generate sales and profits. Key activity ratios include the inventory conversion period, receivables collection period, payables deferral period, operating cycle, and cash conversion cycle.

3.1 Inventory Conversion Period (Inventory Turnover in Days)

$$\begin{aligned}\text{Inventory conversion period} &= 365 \times \frac{\text{Average inventory}}{\text{Cost of goods sold}} \\ &= 365 \times \frac{(\$290,000 + \$275,000) / 2}{\$1,000,000} \\ &= 103.11 \text{ days}\end{aligned}$$

(Industry average: 78 days)

This ratio indicates the average number of days required to sell inventory. Inventory will typically be averaged in this ratio in order to align the time period to cost of goods sold. Gi is forecasting a Year 2 inventory conversion ratio that is significantly higher than the industry average, which means that it will take the company longer to convert its inventory into sales. This ratio will need to be reduced over the next several years, or the company will risk its inventory becoming obsolete (as well as potentially incurring higher carrying costs in order to sustain the inventory).

- **Projection Interpretations:** This ratio reflects how long it takes on average to turn inventory into sales. The output will be in days, with a lower number of days indicating a company is more efficient in converting inventory into sales. Projected sales will affect projected inventory, which will influence the projected inventory conversion period.

3.2 Receivables Collection Period (Accounts Receivable Turnover in Days)

$$\begin{aligned}\text{Receivables collection period} &= 365 \times \frac{\text{Average net receivables}}{\text{Net credit sales}} \\ &= 365 \times \frac{(\$300,000 + \$390,000) / 2}{\$1,800,000} \\ &= 69.96 \text{ days}\end{aligned}$$

(Industry average: 55 days)

This ratio indicates the receivables' quality and the success of the firm in collecting outstanding receivables. The net sales number from the income statement is equal to gross sales less sales returns and allowances. Receivables are often averaged in this ratio to align to the period covered by net sales on the income statement. Although Gi is forecasting a 70-day receivables collection period (relative to the industry average of 55), it is forecasting an increase in sales along with a decrease in the receivables balance, implying that it expects to collect on much of its outstanding receivables while boosting revenue. Gi is still unfavorable relative to the industry, but it is moving in the right direction.

- **Projection Interpretations:** This measure provides an average number of days to convert sales into cash. A shorter number of days indicates that a company is doing a good job collecting on its outstanding receivables. Future expected growth in sales will likely tie to increases in receivables, unless a company projects a change in the percentage of credit sales relative to cash sales.

3.3 Payables Deferral Period (Accounts Payable Turnover in Days)

$$\begin{aligned}\text{Payables deferral period} &= 365 \times \frac{\text{Average accounts payable}}{\text{Cost of goods sold}} \\ &= 365 \times \frac{(\$150,000 + \$125,000) / 2}{\$1,000,000} \\ &= 50.19 \text{ days}\end{aligned}$$

(Industry average: 62 days)

7
Accounts payable will typically be averaged to align with the time period associated with cost of goods sold. Here, Gi is forecasting a little over 50 days to pay its vendors, whereas the industry takes 62 days. As long as the company is meeting the payment terms of its vendors, it should look to extend this period in order to conserve cash.

- **Projection Interpretations:** This is a measure of how long it takes for a company to pay its vendors for goods purchased on credit. If a company wishes to conserve cash, it will project longer average time periods to pay its vendors.

3.4 Operating Cycle

$$\begin{aligned}\text{Operating cycle} &= \text{Inventory conversion period} + \text{Receivables collection period} \\ &= 103.11 \text{ days} + 69.96 \text{ days} \\ &= 173.07 \text{ days}\end{aligned}$$

The operating cycle indicates the number of days between acquisition of inventory and realization of cash from selling the inventory. The inventory conversion period and receivables collection period calculations are shown earlier in this section.

- **Projection Interpretations:** The operating cycle represents the amount of time it takes a company to convert inventory into cash. Changes to inventory management policies and receivables collection processes will affect whether this cycle increases or decreases in the future.

3.5 Cash Conversion Cycle

$$\begin{aligned}\text{Cash conversion cycle} &= \frac{\text{Inventory}}{\text{conversion period}} + \frac{\text{Receivables}}{\text{collection period}} - \frac{\text{Payables}}{\text{deferral period}} \\ &= 69.96 \text{ days} + 103.11 \text{ days} - 50.19 \text{ days} \\ &= 122.88 \text{ days}\end{aligned}$$

(Industry average: 71 days)

Gi is forecasting a cash conversion cycle that is double that of its industry. Although it is expected that a relatively new company such as Gi will take some time to develop efficiencies and procedures designed to maximize its cash position, there is room for improvement in all three components that make up this cycle. Gi will have to address how fast it converts inventory into sales, how fast it collects outstanding receivables, and how long it takes Gi to pay its vendors. The biggest area for improvement is inventory conversion.

- **Projection Interpretations:** All else being equal, a lower cash conversion cycle is better because a company would want to minimize the number of days it takes to convert inventory into sales and sales into cash, while taking as long as possible to pay its vendors. Similar to the operating cycle, policy and forecasted cash flow decisions will influence this cycle time.

Example 1

Cash Conversion Cycle

Facts: A company expects to reduce its operating cycle by five full days as a result of new sales initiatives and more aggressive collection policies.

Required: If the cash conversion cycle is projected to be three days shorter than before, compute the change in the payables deferral period.

Solution: The operating cycle consists of the inventory conversion period and receivables collection period, which represents two-thirds of the cash conversion cycle. If the overall cash conversion cycle is projected to be three days shorter and the operating cycle will be five days shorter, it must be a case that the payables deferral period is decreasing by two days.

4 Debt Ratios

Debt ratios measure the extent to which a company employs financial leverage in its capital structure. Although debt is cheaper than equity from a cost standpoint because of the tax benefits and lower interest rates, too much debt is risky for the borrowing company. Key debt ratios include the debt-to-equity ratio, debt-to-assets ratio, debt-to-total-capital ratio, interest coverage ratio, and debt service coverage ratio.

4.1 Debt-to-Equity Ratio

$$\text{Debt-to-equity ratio} = \frac{\text{Total liabilities}}{\text{Common stockholders' equity}}$$

$$\text{Year 2} = \frac{\$1,345,000}{\$1,470,000} = 0.91$$

$$\text{Year 1} = \frac{\$1,400,000}{\$1,350,000} = 1.04$$

(Industry average = 0.75)

This ratio indicates the degree of protection to creditors in case of insolvency. A lower ratio is better. Gi is forecasting a reduction in this ratio, which is positive as both current and long-term liabilities are forecasted to decline and equity is forecasted to increase due to net income from Year 2. The goal for the company should be to get this ratio closer to the industry average, which can be accomplished by paying down debt. If new debt is added, there should be at least as much growth in equity to cover the debt increase.

- **Projection Interpretations:** A higher debt-to-equity ratio indicates that the company employs more risk. If a company anticipates issuing debt in the future or reducing the amount of outstanding stock, this ratio will increase. Ideally, a company will choose the mix of liabilities and equity that will minimize its overall cost of capital.

4.2 Debt-to-Assets Ratio

$$\text{Debt-to-assets ratio} = \frac{\text{Total liabilities}}{\text{Total assets}}$$

$$\text{Year 2} = \frac{\$1,345,000}{\$2,815,000} = 47.8\%$$

$$\text{Year 1} = \frac{\$1,400,000}{\$2,750,000} = 50.9\%$$

(Industry average: 40%)

Gi's debt-to-assets ratio is forecasted to improve due to an increase in assets and a decrease in liabilities. Because a higher ratio indicates higher risk, this forecast shows a positive trend and will get the company closer to the industry average.

- **Projection Interpretations:** Very similar to the debt-to-equity ratio, a company's risk level increases as this ratio increases. Forecasted future year asset and liability totals are compared to produce a projected debt-to-assets ratio. If a company wishes to lower its risk levels, it will have to reduce total liabilities or increase total assets without incurring more debt.

4.3 Times Interest Earned (Interest Coverage) Ratio

$$\text{Times interest earned ratio} = \frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest expense}}$$

$$\text{Year 2} = \frac{\$303,030 + \$10,000}{\$10,000} = 31.3 \text{ times}$$

$$\text{Year 1} = \frac{\$272,730 + \$10,300}{\$10,300} = 27.5 \text{ times}$$

(Industry average: 24.5 times)

Gi has a more favorable ratio than its peers. The ratio of 27.48 days for Year 1 is forecasted to increase to 31.30 days, which shows the company can cover its debt expenses.

- Projection Interpretations:** A higher number implies that a company has more funding to cover its required interest expense associated with debt. By paying down old debt or replacing old debt with new debt carrying lower interest rates, interest expense can be lowered in the future, which will increase this ratio.

5 Profitability Ratios

The focus of profitability ratios is on determining how profitable a company is at various levels of its business. Although the bottom line is very important, cost controls earlier in the process can be extremely beneficial for a company. Common profitability ratios include the margins (gross, operating, and net), return on equity, and return on assets.

5.1 Gross Margin

$$\text{Gross margin} = \frac{\text{Sales} - \text{Cost of goods sold}}{\text{Sales}}$$

$$\text{Year 2} = \frac{\$1,800,000 - \$1,000,000}{\$1,800,000} = 44.4\%$$

$$\text{Year 1} = \frac{\$1,700,000 - \$940,000}{\$1,700,000} = 44.7\%$$

(Industry average: 48%)

This ratio is looking at profitability at the highest level. Gi is forecasting relatively flat gross margins in Year 2 relative to Year 1. As the company becomes more efficient in its operations and reduces costs relative to sales, this ratio should improve such that it meets or exceeds the industry average.

- Projection Interpretations:** All profitability margins are interpreted the same way: All else being equal, higher is better. Sales are forecast to grow at a certain percentage each year based on a variety of factors described earlier in the text. For ease of calculation purposes, cost of goods sold is often forecast to remain a specific percentage of sales—keeping the gross margin constant.

5.2 Operating Margin

$$\text{Operating margin} = \frac{\text{Operating income}}{\text{Sales}}$$

$$\text{Year 2} = \frac{\$313,030}{\$1,800,000} = 17.4\%$$

$$\text{Year 1} = \frac{\$283,030}{\$1,700,000} = 16.6\%$$

(Industry average: 19%)

This ratio represents profitability after all nonfinancing and nontax costs are taken into account. Gi's operating margin is forecasted to increase from Year 1 to Year 2. Gi should continue to find ways to increase sales while controlling costs.

- **Projection Interpretations:** A higher ratio is better, as higher operating income indicates more sales generated using fewer costs. This represents the profitability of a company taking into account everything other than financing decisions (issuance of debt and equity) and tax effects over which the company has very little control. Projected changes in sales, cost of goods sold, and/or SG&A expenses will affect this ratio.

5.3 Net Profit Margin

$$\text{Net profit margin} = \frac{\text{Net income}}{\text{Sales}}$$

$$\text{Year 2} = \frac{\$200,000}{\$1,800,000} = 11.1\%$$

$$\text{Year 1} = \frac{\$180,000}{\$1,700,000} = 10.6\%$$

(Industry average: 13%)

As with all margins, the goal is to increase the ratio. Gi is forecasting an increase in the net profit margin. Controlling growth in costs while continuing to increase sales will get the company closer to the industry average.

- **Projection Interpretations:** The higher the net profit margin the better, as this means a company is profitable after taking into account all costs associated with generating sales and operating its business. This is one of the key measures a company evaluates in making projections, as this will likely impact future capital structure decisions and stock growth.

5.4 Return on Equity (ROE)

$$\begin{aligned}\text{Return on equity (ROE)} &= \frac{\text{Net income} - \text{Preferred dividends}}{\text{Average shareholders' equity}} \\ &= \frac{\$200,000 - \$0}{(\$1,470,000 + \$1,350,000) / 2} \\ &= 14.2\%\end{aligned}$$

(Industry average: 15%)

Gi's forecasted ROE for Year 2 is very close to the industry average. Continued growth in profitability while managing dividend outflows will boost this ratio. Because net income comes from the income statement and shareholders' equity comes from the balance sheet, it is common practice to use average shareholders' equity in the denominator.

- **Projection Interpretations:** A higher ROE is desirable, as higher net income for shareholders means greater profitability, higher earnings per share, and probable future stock growth. While equity is a by-product of future capital structure decisions, future net income (which also affects equity) will be a result of forecasted sales and costs.

5.5 Return on Assets (ROA)

$$\begin{aligned}\text{Return on assets (ROA)} &= \frac{\text{Net income}}{\text{Average total assets}} \\ &= \frac{\$200,000}{\$2,782,500} \\ &= 7.2\%\end{aligned}$$

(Industry average: 8%)

In line with other profitability and return measures, Gi's ROA is slightly below the industry average. As long as Gi can continue to increase its bottom-line profits at a rate faster than overall asset growth, this measure will improve. Similar to ROE, common practice is to take the average balance of assets at the beginning and end of the period in order to align with the period covered by net income.

- **Projection Interpretations:** A higher ROA implies that a company is generating more profits relative to its base of assets. Projected net income should be compared with projected assets to determine whether this ratio is increasing or decreasing in the future.

Question 1**CPA-03991**

Which of the following transactions does not change the current ratio or total current assets?

- a. A cash advance is made to a divisional office.
- b. A cash dividend is declared.
- c. Short-term notes payable are retired with cash.
- d. Equipment is purchased with a three-year note and a 10 percent cash down payment.

[Answer](#) [Explanation](#)**Question 2****CPA-04009**

An increase in sales collections resulting from an increased cash discount for prompt payment would be expected to cause a(n):

- a. Increase in the operating cycle.
- b. Increase in the average collection period.
- c. Decrease in the cash conversion cycle.
- d. Increase in bad debt losses.

[Answer](#) [Explanation](#)



RT

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1 Terms Related to Marginal Analysis

The operational decision method, referred to as *marginal analysis*, is used when analyzing business decisions such as the introduction of a new product or changes in output levels of existing products, acceptance or rejection of special orders, making or buying a product or service, selling or processing further, and adding or dropping a segment. Marginal analysis focuses on the relevant revenues and costs that are associated with a decision.

1.1 Relevant Revenues and Costs

When making business decisions that will affect future periods, revenues and costs related to those decisions are deemed to be relevant only if they change as a result of selecting different alternatives. Although variable costs are more likely to be relevant because they change with production volume and output, relevant costs can be either fixed or variable.

Relevant costs often share similar characteristics, including their specific traceability to cost objects that may change as a result of selecting different alternatives. Ultimately, a cost's relevance pertains to its potential to affect the decision.

- **Direct Costs:** Costs that can be identified with or traced to a given cost object. Direct costs are usually relevant (variable costs are generally direct costs).
- **Prime Costs:** Direct material and direct labor costs, which are generally relevant.
- **Discretionary Costs:** Costs arising from periodic (usually annual) budgeting decisions by management to spend in areas not directly related to manufacturing. Discretionary costs are generally relevant.

Illustration 1 Discretionary Costs

Costs to maintain landscaping at a corporation's headquarters are generally viewed as discretionary.

- **Incremental Costs:** Also known as marginal costs, differential costs, or out-of-pocket costs, the additional costs incurred to produce an additional amount of the unit over the present output. Incremental costs are relevant costs and include all variable costs and any avoidable fixed costs associated with a decision.
- **Opportunity Costs:** The cost of foregoing the next best alternative when making a decision. Opportunity costs are relevant costs.

Illustration 2 Opportunity Costs

1. Costs related to a special device that is necessary if a special order is selected are relevant.
2. Costs associated with alternative uses of plant space are relevant.

- **Irrelevant Costs:** Costs that do not differ among alternatives are irrelevant and should be ignored in a marginal cost analysis.
- **Sunk Costs:** Costs that are unavoidable because they were incurred in the past and cannot be recovered as a result of a decision. Sunk costs are not relevant costs.

Illustration 3 Sunk Costs

Electramag Corporation is evaluating whether to replace a piece of equipment. The cost of the old equipment is a sunk cost and is not relevant to the replacement decision. Additionally, under either alternative (keep the old equipment or replace it), the anticipated cost of electricity remains the same. The cost of electricity is a variable cost. Even so, the cost of electricity is not relevant because it does not change regardless of the selected alternative.

- **Controllable Costs:** Costs that are authorized by the business unit manager or the decision maker. The ability to control cost is evaluated when analyzing business decisions. By classifying a cost as either controllable or uncontrollable, the specific level of management responsible for the cost is identified. Controllable costs are relevant if they will change as a result of selecting different alternatives.
- **Uncontrollable Costs:** Costs that were authorized at a different level in the organization. Uncontrollable costs are not relevant costs because they cannot be changed by the manager making the decision.

Illustration 4 Controllable vs. Uncontrollable Costs

A manufacturing department manager has control over the materials and supplies used in the manufacturing department (i.e., controllable costs), but that manager has no control over the fixed asset depreciation allocated to the department (i.e., uncontrollable costs).

- **Avoidable Costs and Revenues:** Costs and revenues that result from choosing one course of action instead of another. As a result, the firm avoids the cost and revenue associated with the course of action not selected. They are relevant to the decision.
- **Unavoidable Costs:** Costs that are the same regardless of the chosen course of action are unavoidable costs that are not relevant to future decisions. These costs will continue regardless of the course of action taken. They have no effect on the decision.

2 Special Order Decisions

Special order decisions are defined as opportunities that require a firm to decide whether a specially priced order should be accepted or rejected. Decisions of this character involve a comparison of the special order price to the relevant costs of the decision and an analysis of the strategic issues that relate to the acceptance or rejection of the order.

2.1 Determining Relevant Costs

2.1.1 Capacity Issues

Special orders are short-term decisions that often assume excess capacity. Fixed costs are generally not relevant to these decisions unless the special order will change total fixed costs.

■ Presumed Excess Capacity

If there is excess capacity, a comparison should be made of the incremental costs of the order to the incremental revenue generated by the order. The special order should be accepted if the selling price per unit is greater than the variable cost per unit.

■ Presumed Full Capacity

If the company is operating at full capacity, the opportunity cost of producing the special order should be included in the analysis.

- The production that is forfeited to produce the special order is the next best alternative use of the facility.
- The opportunity cost is the contribution margin that would have been produced if the special order were not accepted.

Example 1

Special Order With Excess Capacity

Facts: Kator Company is a manufacturer of industrial components. Product KB-96 is normally sold for \$150 per unit and has the following costs per unit:

Direct materials	\$20
Direct labor	15
Variable manufacturing overhead	12
Fixed manufacturing overhead	30
Shipping and handling costs	3
Fixed selling costs	10
Total cost	<u>\$90</u>

Kator has received a special, one-time order for 1,000 units of KB-96.

Required: Assuming that Kator has excess capacity, calculate the minimum acceptable price for this one-time special order.

Solution: The fixed manufacturing overhead and the fixed selling costs are not relevant to the decision. The incremental per-unit production cost is the total variable cost per unit of \$50. Kator should accept the special order only if the selling price per unit is greater than \$50.

Example 2**Special Order With No Excess Capacity**

Facts: Assume the same costs as in the previous example. Kator has received a special, one-time order for 1,000 units of KB-96. Assume that Kator is operating at full capacity. Also assume that the next best alternative use of the capacity is the production of LB-64, which would produce a contribution margin of \$10,000.

Required: Calculate the minimum acceptable price for this one-time special order.

Solution: Kator's next best alternative use of its capacity would produce a contribution margin of \$10,000. If Kator produces 1,000 units of KB-96, this \$10-per-unit ($\$10,000 / 1,000 \text{ units}$) opportunity cost would be added to the variable cost of \$50 to determine the minimum justifiable price for the special order. Kator should accept the special order only if the selling price per unit is greater than \$60.

2.2 Strategic Factors

The acceptance of a special order also requires consideration of a number of strategic factors, including:

- The effect on regular-priced sales and other long-term pricing issues.
- The possibility of future sales to this customer.
- The possibility of exceeding plant capacity or the complexities of the order itself.
- The pricing of the special order.
- The impact of income taxes.
- The effect on machinery and/or the scheduled machine maintenance program.

3 Make vs. Buy

The decision to make or buy a component (also referred to as insourcing versus outsourcing) is similar to the special order decision. Managers should select the lowest-cost alternative.

3.1 Determining Relevant Costs and Other Make-or-Buy Issues

3.1.1 Capacity Issues

- **Excess Capacity:** If there is excess capacity, the cost of making the product internally is the cost that will be avoided (or saved) if the product is not made. This will be the maximum outside purchase price.
- **No Excess Capacity:** If there is no excess capacity, the cost of making the product internally is the cost that will be avoided (saved) if the product is not made plus the opportunity cost associated with the decision.

Example 3**Make vs. Buy Decisions**

Facts: Offset Manufacturing produces 20,000 units of part No. 125. The production costs are:

	Total Cost	Cost per Unit
Direct materials	\$ 10,000	\$.50
Direct labor	40,000	2.00
Variable manufacturing overhead	20,000	1.00
Fixed factory overhead	<u>40,000</u>	<u>2.00</u>
Total cost	<u>\$110,000</u>	<u>\$5.50</u>

An outside manufacturer approaches Offset Manufacturing and offers to sell it the same part for \$5 per unit. Offset has excess capacity. The \$10,000 factory floor supervisor's salary is the only fixed cost that will be eliminated if Offset purchases the part.

Required: Determine whether Offset Manufacturing should make or buy the part.

Solution:

	<i><u>Make</u></i>		<i><u>Buy</u></i>	
	Total	Per Unit	Total	Per Unit
Purchase cost			\$100,000	\$5.00
Direct materials	\$10,000	\$.50		
Direct labor	40,000	2.00		
Variable factory overhead	20,000	1.00		
Fixed factory overhead (avoidable)	<u>10,000</u>	<u>0.50</u>		
Total relevant costs	<u>\$80,000</u>	<u>\$4.00</u>	<u>\$100,000</u>	<u>\$5.00</u>
Difference	\$20,000	\$1.00		

Offset will choose to make the part because it is the lowest-cost alternative when relevant costs are considered.

5

3.2 Strategic Factors

The following strategic factors should be considered when analyzing a make-or-buy decision:

- The quality of the product purchased compared with the quality of the product manufactured.
- The reliability of the purchased product.
- The value of service contracts or other warranties.
- The risks associated with outsourcing or buying outside the organization, including inflexibility, loss of control, and less confidentiality.
- The most efficient use of the entity's resources.

4 Sell or Process Further

The decision regarding *additional processing* is made based on profitability.

4.1 Joint Costs

Joint costs are the costs of a single process that yields multiple products (e.g., the processing of a pig to produce ham, bacon, and pork chops). Joint costs cannot be traced to an individual product. Joint costs are sunk costs that are not relevant to decisions of whether to sell or to process further.

4.2 Separable Costs

Separable costs are costs incurred after the split-off point that can be traced to individual products and are relevant to decisions of whether to sell or to process further.

4.3 Deciding Factors to Sell or Process Further

The decision on whether to sell at the split-off point is made by comparing the incremental cost and the incremental revenue generated after the split-off point.

If the incremental revenue exceeds the incremental cost, the organization should process further.

If the incremental cost exceeds the incremental revenue, the organization should sell at the split-off point.

Example 4

Sell or Process Further

Facts: Jackson Inc. processes raw materials into beauty products. The Soap Division (Soap) processes fats and lye at a cost of \$200 per batch, which yields 2,000 bars of soap. Soap can sell the soap for \$0.50 per bar at this point. Alternatively, various fragrances and oils can be added to produce fine soaps for the high-end retail market from a given batch of raw materials. Soap could incur an additional cost of \$1.20 per bar of soap for the perfumes and attractive packaging and create lavender-scented soap. Or, for an additional cost of \$1.75 per bar, Soap could create rose-scented soap. The high-end soap would sell for \$1.30 per bar for the lavender scent and \$3 per bar for the rose scent.

Required: Determine whether the soap division will produce the lavender soap, rose-scented soap, or both.

Solution: The Soap Division will not produce the lavender soap because the costs after the split-off point are \$1.20 per bar and the incremental revenue is only \$0.80 (\$1.30 for lavender soap minus the \$0.50 revenue for basic soap). Incremental revenue is less than incremental costs.

If the company decides to produce rose-scented soap, incremental costs are \$1.75 per bar and incremental revenue is \$2.50 (\$3 minus \$0.50) per bar. Because the incremental revenue exceeds incremental costs, Soap would produce rose soap.

5 Keep or Drop a Segment

Relevant costs should be used to determine whether to *keep or drop a business segment*.

5.1 Classification of Costs

The fixed costs associated with the segment must be identified as either avoidable (relevant) or unavoidable, even if the segment is discontinued.

5.2 Decision Factors

A firm should compare the fixed costs that can be avoided if the segment is dropped (i.e., the cost of running the segment) to the contribution margin that will be lost if the segment is dropped.

- Keep the segment if the lost contribution margin exceeds avoided fixed costs.
- Drop the segment if the lost contribution margin is less than avoided fixed costs.

Example 5 Fixed Costs Are Unavoidable

Facts: The executives at Chowderhead Industries are evaluating each of their product lines. A variable costing analysis by product shows that the company's clam and corn chowder products are profitable but its conch chowder product is not.

Description	Clam	Conch	Corn	Total
Sales	\$125,000	\$75,000	\$50,000	\$250,000
Variable costs	<u>90,000</u>	<u>60,000</u>	<u>25,000</u>	<u>175,000</u>
Contribution margin	35,000	15,000	25,000	75,000
Fixed costs	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>	<u>60,000</u>
Operating Income	<u>\$ 15,000</u>	<u>\$ (5,000)</u>	<u>\$ 5,000</u>	<u>\$ 15,000</u>

The conch chowder fixed costs are unavoidable.

Required: Determine whether Chowderhead should eliminate its conch chowder product line.

Solution: If the conch chowder fixed costs are unavoidable, they will be incurred even if conch chowder is eliminated.

Description	Clam	Conch	Corn	Total
Sales	\$125,000	-	\$50,000	\$175,000
Variable costs	<u>90,000</u>	<u>-</u>	<u>25,000</u>	<u>115,000</u>
Contribution margin	35,000	-	25,000	60,000
Fixed costs	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>	<u>60,000</u>
Net Income	<u>\$ 15,000</u>	<u>\$(20,000)</u>	<u>\$ 5,000</u>	<u>-</u>

The conch chowder product line should not be eliminated. Elimination of the product would eliminate company-wide profits because the product makes a positive contribution to covering the entity's fixed costs.

Example 6**Some Fixed Costs Are Avoidable**

Facts: Assume that \$16,000 of the Conch Chowder fixed costs are avoidable advertising costs that will not be incurred if the product is eliminated.

Required: Given these new facts, determine whether Chowderhead Industries should eliminate its conch chowder product line.

Solution: If \$16,000 of the fixed costs are avoidable, then only \$4,000 are unavoidable and will be incurred even if conch chowder is eliminated.

Description	Clam	Conch	Corn	Total
Sales	\$125,000	-	\$50,000	\$175,000
Variable costs	<u>90,000</u>	<u>-</u>	<u>25,000</u>	<u>115,000</u>
Contribution margin	35,000	-	25,000	60,000
Unavoidable fixed costs	15,000	4,000	16,000	35,000
Avoidable fixed costs	<u>5,000</u>	<u>-</u>	<u>4,000</u>	<u>9,000</u>
Operating Income	<u>\$ 15,000</u>	<u>\$ (4,000)</u>	<u>\$ 5,000</u>	<u>\$ 16,000</u>

The Chowderhead executives should eliminate the conch chowder product line because the avoidable fixed costs exceed the contribution margin that is lost when the product is eliminated. In this case, elimination of the conch chowder product line improves overall productivity from \$15,000 to \$16,000.

5.3 Strategic Factors

Important strategic factors to consider include:

- The complementary character of products and their relationship to the sales of other products. Manufacturers might produce and price certain products as loss leaders to promote sales of more profitable products.
- The impact of product addition or deletion on employee morale.
- The growth potential of each product regardless of individual profitability.
- Opportunity costs associated with available capacity.

Question 1**CPA-06169**

The Danforth Corp. circuit production plant has a 12,000-unit capacity and currently produces 10,000 circuits per year. The company incurs \$50,000 in variable costs for its current production and carries a \$40,000 fixed cost burden.

If Danforth has an opportunity to fill a special order for 1,000 circuits, the price per unit for the order should exceed:

- a. \$4.00
- b. \$5.00
- c. \$8.33
- d. \$9.00

Answer Explanation**Question 2****CPA-06170**

The Danforth Corp. circuit production plant has a 10,000-unit capacity and currently produces 10,000 circuits per year. The company incurs \$50,000 in variable costs for its current production and carries a \$40,000 fixed cost burden.

Danforth has explored other alternatives and knows that the next best alternative would produce a \$2,000 contribution margin for a 1,000-unit run. If Danforth has an opportunity to fill a special order for 1,000 circuits, the price per unit of the order should exceed:

- a. \$2.00
- b. \$5.00
- c. \$7.00
- d. \$11.00

Answer Explanation



RT

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1 Operational and Tactical Planning

Operational and tactical planning is the process of determining the specific objectives and means by which strategic plans will be achieved. Tactical plans are short term and cover periods up to 18 months.

1.1 Single-Use Plans

Tactical plans are also called *single-use plans* because they are developed to apply to specific circumstances during a specific time frame.

1.2 Annual Budget

An *annual budget* is a (type of) single-use tactical plan. Budgets translate the strategic plan and implementation into a period-specific operational guide. Placing responsibility for achievement of strategic goals in the hands of managers promotes routine accomplishment of strategy as part of the manager's job function.

2 Budget Policies

To effectively budget, an organization should implement formal *budget policies* that include the following key features.

2.1 Management Participation

Typically, a budget will extend for a period of one year and involve numerous individuals. The budget process normally involves a budget committee, which includes members of senior management. The budget committee is charged with resolving disputes and making final decisions regarding major budget changes.

2.2 Budget Guidelines

Top management should provide *guidelines* for budget preparation based on the entity's strategic goals and long-term plan. These guidelines should include:

2.2.1 Evaluation of Current Conditions

- Consideration of the changes to the environment since the adoption of the strategic plan.
- Organizational goals for the coming period.
- Operating results year-to-date.

2.2.2 Management Instructions

- Setting the tone for the budget (e.g., cost containment, innovation, etc.).
- Corporate policies (e.g., mandated downsizing).

3 Standards and Benchmarking

Budgets frequently revolve around the development of standards. Standards have been referred to as per-unit budgets and are integral to the development of flexible budgets.

3.1 Ideal and Currently Attainable Standards

Standards are often set below expectations to motivate productivity and efficiency, but those standard costs must be revised periodically (generally once a year) to reflect changes in previously determined standards. The best standard is the standard that leads to the accomplishment of strategic goals.

3.1.1 Ideal Standards

Ideal standards represent the costs that result from perfect efficiency and effectiveness in job performance. Ideal standards are generally not historical; they are forward-looking. No provision is made for normal spoilage or downtime.

- **Advantage:** An advantage of using ideal standards is the implied emphasis on continuous quality improvement (CQI) to meet the ideal.
- **Disadvantage:** A disadvantage is the demotivation of employees by the use of unattainable standards.

3.1.2 Currently Attainable Standards

Currently attainable standards represent costs that result from work performed by employees with appropriate training and experience but without extraordinary effort. Provisions are made for normal spoilage and downtime.

- **Advantage:** Fosters the perception that standards are reasonable.
- **Disadvantage:** Required use of judgment and potential manipulation.

3.2 Authoritative and Participative Standards

3.2.1 Authoritative Standards

Authoritative standards are set exclusively by management.

- **Advantage:** Authoritative standards can be implemented quickly and will likely include all costs.
- **Disadvantage:** Workers might not accept imposed standards.

3.2.2 Participative Standards

Participative standards are set by both managers and the individuals who are held accountable to those standards.

- **Advantage:** Workers are more likely to accept participative standards.
- **Disadvantage:** Participative standards are slower to implement.

4 Master Budgets

A *master budget* (or "annual business plan") documents specific short-term operating performance goals for a period, normally one year or less. The plan normally includes an operating (nonfinancial) budget as well as a financial budget that outlines the sources of funds and detailed plans for their expenditure.

4.1 Overview

4.1.1 Purpose

Annual business plans are prepared to provide comprehensive and coordinated budget guidance for an organization consistent with overall strategic objectives.

- **Control Objective:** The master budget serves to communicate the criteria for performance over the period covered by the budget.
- **Terminology:** Master budgets are alternatively referred to as static budgets, annual business plans, profit planning, or targeting budgets.
- **Use:** Annual business plans are appropriate for most industries but are particularly useful in manufacturing settings that require coordination of financial and operating budgets.

4.1.2 Components

A master budget generally comprises operating budgets and financial budgets prepared in anticipation of achieving a *single level of sales volume* for a specified period.

- **Pro Forma Financial Statements:** The ultimate output of the annual business plan is a series of pro forma financial statements, including a balance sheet, an income statement, and a statement of cash flows.
- **Assumptions:** Pro forma financial statements are supported by schedules that reflect the underlying operating assumptions that produce those statements.

4.1.3 Limitations of the Annual Plan

- **Master Budget Confined to One Year at a Single Level of Activity:** Budget amounts may be much different from actual results, even though the relationship between expenses and revenues is consistent. An annual static budget divided by 12 (to establish a monthly budget) may exaggerate variances due to seasonal or volume fluctuations.
- **Reporting Output:** The product of the process is a set of pro forma financial statements. Although familiar, pro forma financial statements may not provide the type of management information most useful to decision making.

4.2 Mechanics of Master Budgeting

The annual business-plan process produces the following budgets and reports:

4.2.1 Operating Budgets

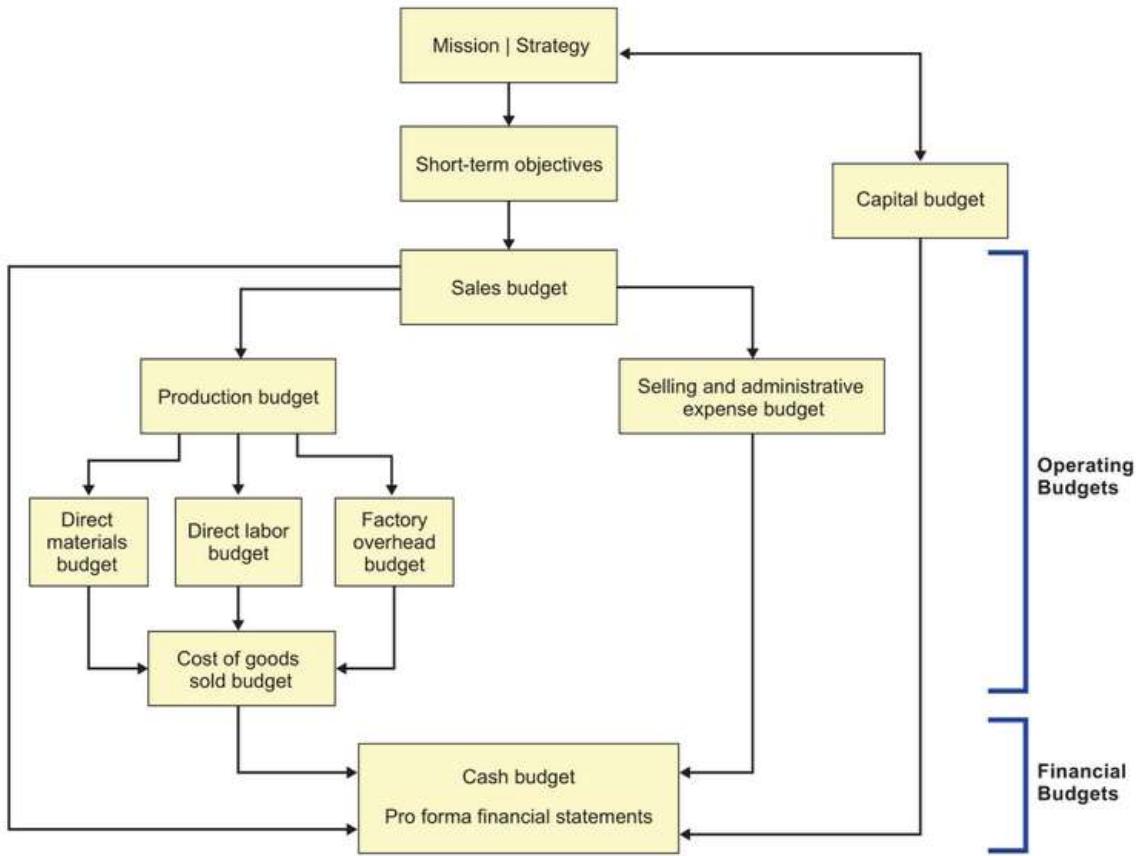
Operating budgets are established to describe the resources needed and the manner in which those resources will be acquired. Operating budgets include:

- Sales budgets
- Production budgets
- Selling and administrative budgets
- Personnel budgets

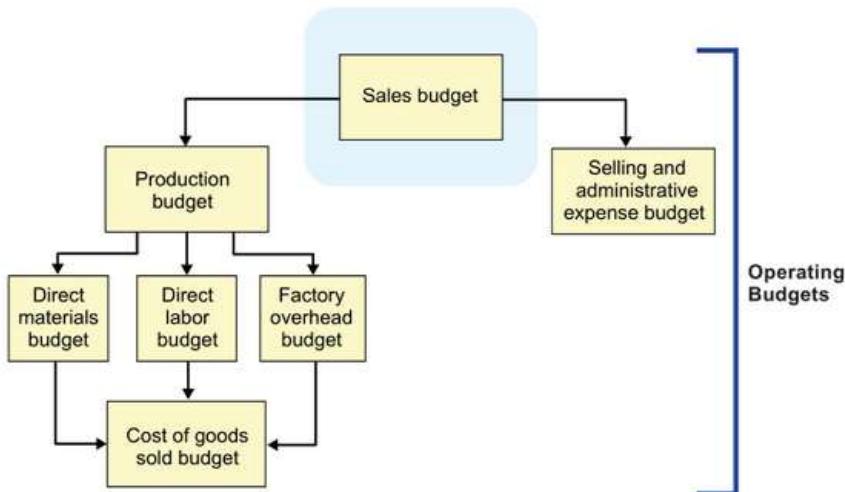
4.2.2 Financial Budgets

Financial budgets define the detailed sources and uses of funds to be used in operations.
Financial budgets include:

- Pro forma financial statements
- Cash budgets



5 Operating Budgets: Sales Budget



The sales budget is the foundation of the entire budget process. The sales budget represents the anticipated sales of the organization in units and dollars. The sales budget is the first budget prepared and it drives the development of most other components of the master budget. Sales budget units drive the number of units required by the production budget. Sales budget dollars drive the anticipated cash and revenue figures. Inventory levels, purchases, and operating expenses are coordinated with sales levels.

5.1 Sales Forecasting and Budgeting

The *sales budget* is based on the sales forecast. Sales forecasts are derived from input received from numerous organizational resources, including the opinions of sales staff, statistical analysis of correlation between sales and economic indicators, and opinions of line management. Sales forecasts are developed after consideration of the following factors:

- Past patterns of sales
- Sales force estimates
- General economic conditions
- Competitors' actions
- Changes in the firm's prices
- Changes in product mix
- Results of market research studies
- Advertising and sales promotion plans

Example 1

Sales Budget

Facts: Blanchforte Stereo is a retailer of audio equipment. Blanchforte's sales manager is working with the controller to develop the sales budget for the next year. Blanchforte's sales manager knows that sales volume is seasonal and that it can be influenced by price and by promotions. The sales manager has developed the following sales forecasts based on units to be sold and average selling price.

Assumptions for Forecasts

First-quarter sales are often weak. The sales manager projects the following sales volumes for aggregate units and average prices.

- 2,000 units at full retail of \$75
- 2,500 units assuming discounts down to \$60

Second-quarter sales strengthen somewhat for graduation and Father's Day promotions. A greater volume and ability to collect full retail can be anticipated based on promotions.

- 3,000 units at full retail of \$75
- 4,000 units assuming discounts down to \$60

Third-quarter sales historically decline despite summer vacation and back-to-school promotions.

- 1,500 units at full retail of \$75
- 2,000 assuming discounts down to \$50

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Fourth-quarter sales spike in response to holiday spending.

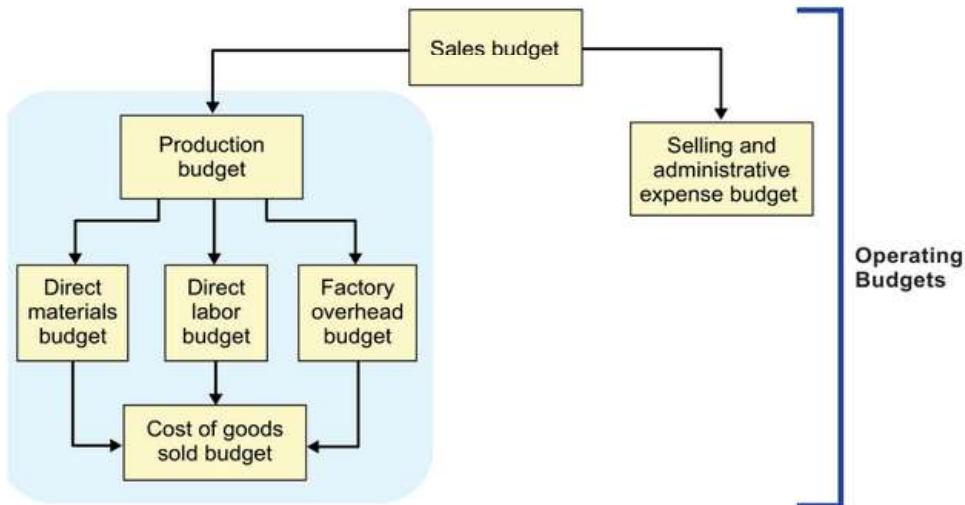
- 7,000 units at full retail of \$75
- 10,000 units at discounts down to \$60

Required: Use the sales forecasts to develop the sales budget, assuming that the company has selected a cost-leadership strategy.

Solution:

	Q1	Q2	Q3	Q4	Total
Sales (units)	2,500	4,000	2,000	10,000	
Average price	\times \$60	\times \$60	\times \$50	\times \$60	
Total	\$150,000	+ \$240,000	+ \$100,000	+ \$600,000	= \$1,090,000

6 Operating Budgets: Production Budget



Production/inventory budgets are prepared for each product or each department based on the amount that will be produced, stated in units. The production budget is made up of the amounts spent for direct labor, direct materials, and factory overhead. The amount of the production budget is based on the amounts of inventory on hand and the inventory necessary to sustain sales.

6.1 Establishing Required Levels of Production

- The relationship between production, sales, and inventory levels is displayed in the following formula:

$$\begin{array}{c}
 \text{Budgeted sales} \\
 + \text{Desired ending inventory} \\
 - \text{Beginning inventory} \\
 \hline
 \text{Budgeted production}
 \end{array}$$

- Desired levels of inventory are normally a function of sales volume and seek to balance the risk of stockouts with the cost of maintaining inventory.

Example 2

Production Budget

Facts: Carlisle Manufacturing is trying to estimate the level of production for the month of June. Assume that Carlisle wants safety stock in beginning inventory of 30 percent of estimated sales and that estimated sales for June and July are as follows:

June → 40,000

July → 30,000

Required: Compute the estimated inventory amounts and estimated production for June.

Solution:

Estimated inventory amounts:

	June	July
Sales	40,000	30,000
Safety stock percentage	$\times \quad 30\%$	$\times \quad 30\%$
Beginning inventory required	<u>12,000</u>	<u>9,000</u>

Estimated production for June:

Budgeted sales for June	40,000
Desired ending inventory	$+ \quad 9,000$
Estimated beginning inventory	$- \quad 12,000$
Budgeted production	<u><u>37,000</u></u>

- Other Factors Affecting the Production Budget**

- Company policies regarding stable production
- Condition of production equipment
- Availability of productive resources
- Experience with production yields and quality

6.2 Direct Materials Budgets

The direct materials required to support the production budget are defined by the direct materials purchases budget and the direct materials usage budget.

6.2.1 Direct Materials Purchases Budget

The *direct materials purchases budget* represents the dollar amount of purchases of direct materials required to sustain production requirements.

- **Number of Units to Be Purchased:** The number of units of direct materials to purchase is calculated from the production budget. The formula is:

$$\begin{array}{r} \text{Units of direct materials needed for a production period} \\ + \text{Desired ending inventory at the end of the period} \\ - \text{Beginning inventory at the start of the period} \\ \hline \text{Units of direct materials to be purchased for the period} \end{array}$$

- **Cost of Direct Materials to Be Purchased:** The cost of direct materials purchased is calculated by applying the anticipated cost per unit of direct materials to the computed amount of direct materials to be purchased.

$$\begin{array}{r} \text{Units of direct materials to be purchased for the period} \\ \times \text{Cost per unit} \\ \hline \text{Cost of direct materials to be purchased for the period (purchases at cost)} \end{array}$$

6.2.2 Direct Materials Usage Budget (Cost of Direct Materials Used)

The direct materials usage budget represents the number of units of direct materials required for production along with the related cost of those direct materials.

- The extended costs associated with direct materials are derived as follows:

$$\begin{array}{r} \text{Beginning inventory at cost} \\ + \text{Purchases at cost} \\ - \text{Ending inventory at cost} \\ \hline \text{Direct materials usage (cost of materials used)} \end{array}$$

6.2.3 Impact of Purchasing Policies

Purchases budgets are influenced by management's philosophy regarding required inventory levels, including safety stock and stockout decisions.

6.3 Direct Labor Budget

Direct labor budgets anticipate the hours and rates associated with workers directly involved in meeting production requirements. Direct labor hours are computed based on the hours necessary to produce each unit of finished goods.

Budgeted production (in units)	
× Hours (or fractions of hours) required to produce each unit	
Total number of hours needed	
× Hourly wage rate	
	Total wages

Example 3

Direct Materials and Labor Budgets

Facts: Carlisle Manufacturing computed its budgeted production at 37,000 units to sustain budgeted sales of 40,000 units in the month of June. Four pounds of direct material are needed to produce each unit of finished product. We assume that new direct materials cost \$10 per pound and that they were previously acquired for \$9 per pound. Carlisle has 48,000 pounds on hand at the beginning of June and has a desired direct materials ending inventory of 36,000.

Two hours of direct labor at \$20 per hour are needed to convert the direct materials to finished goods.

Required: Prepare the direct materials and direct labor budgets for the month of June.

Solution:

Direct materials purchases

Units of direct materials needed for a production period

Budgeted production	37,000 units
Pounds of direct material per unit	4 pounds
Total pounds needed	148,000 pounds

+ Desired ending inventory at the end of the period

Pounds of direct material	36,000 pounds
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- Beginning inventory at the start of the period

Pounds of direct material	(48,000) pounds
---------------------------	-----------------

Direct material to be purchased	136,000
---------------------------------	---------

Cost per pound	× \$10
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Direct material purchases	\$1,360,000
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Direct materials usage budget (cost of direct materials used)

Beginning inventory at cost ($48,000 \times \$9$)	\$432,000
+ Purchases at cost	1,360,000
- Ending inventory at cost ($36,000 \times \$10$)	<u>(360,000)</u>
= Direct materials usage (cost of materials used)	\$1,432,000

Direct labor budget

Budgeted production	37,000 units
Hours of direct labor per unit	<u>2 hours</u>
Total hours needed	74,000 hours
Rate per hour	<u>\$20</u>
Direct labor budget	\$1,480,000

6.4 Factory Overhead Budget

Factory overhead includes the fixed and variable production costs that are not direct labor or direct materials. Factory overhead is applied to inventory (cost of goods manufactured and sold, below) based on a representative statistic (cost driver). Frequently, the rate is applied using direct labor hours.

Example 4**Factory Overhead Budget**

Facts: Carlisle Manufacturing uses direct labor hours to apply variable factory overhead and has determined that its variable overhead rate is \$5 per hour. Assume that the company used 74,000 direct labor hours according to the direct labor budget.

Required: Compute the variable overhead to be applied to the cost of goods manufactured in the month of June.

Solution: Budgeted overhead = 74,000 direct labor hours \times \$5 per hour = \$370,000

6.5 Cost of Goods Manufactured and Sold Budget

The *cost of goods manufactured and sold budget* accumulates the information from the direct labor, direct material, and factory overhead budgets.

6.5.1 Components of the Costs of Goods Manufactured and Sold Budget

The cost of goods manufactured represents the sum of the budgets for each element of manufacturing as follows:

- Direct labor
- Direct material
- Factory overhead

Cost of goods sold considers cost of goods manufactured in relation to beginning and ending inventories of finished goods as follows:

$$\begin{array}{c}
 \text{Cost of goods manufactured} \\
 + \text{ Beginning finished goods inventory} \\
 - \text{ Ending finished goods inventory} \\
 \hline
 \text{Cost of goods sold}
 \end{array}$$

Example 5

Cost of Goods Manufactured and Sold

Facts: Carlisle Manufacturing is preparing its budgeted cost of goods manufactured and budgeted cost of goods sold schedules for the month of June. It has developed the following information:

Direct materials used	\$1,432,000
Direct labor	1,480,000
Factory overhead (variable)	370,000
Factory overhead (fixed)	300,000 (given)
Finished goods (beginning)	1,000,000 (given)
Finished goods (ending)	750,000 (given)

Required: Compute the cost of goods manufactured.

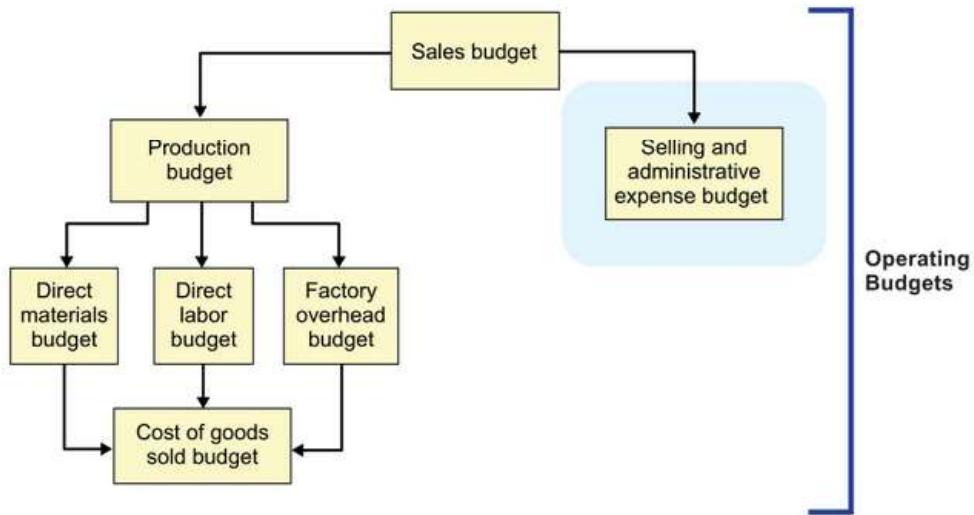
Solution:

Direct materials used	\$1,432,000
Direct labor	1,480,000
Factory overhead (variable)	370,000
Factory overhead (fixed)	<u>300,000</u>
Total cost of goods manufactured	3,582,000
Plus finished goods, beginning	<u>1,000,000</u>
Goods available	4,582,000
Less finished goods, ending	<u>(750,000)</u>
Cost of goods sold	<u><u>\$3,832,000</u></u>

6.5.2 Cost of Goods Sold and the Pro Forma Financial Statements

The budgeted cost of goods sold amount feeds directly into the pro forma income statement. Budgeted cost of goods sold is matched with budgeted sales as a basis for budgeted gross margin.

7 Operating Budgets: Selling and Administrative Expense Budget



Selling and administrative expenses represent the fixed and variable nonmanufacturing expenses anticipated during the budget period.

7.1 Components of Selling and General Administration Expense

7.1.1 Variable Selling Expenses

- Sales commissions
- Delivery expenses
- Bad-debt expenses

7.1.2 Fixed Selling Expenses

- Sales salaries
- Advertising
- Depreciation

7.1.3 General Administrative Expenses (All Fixed)

- Administrative salaries
- Accounting and data processing
- Depreciation
- Other administrative expenses

7.2 Selling and Administrative Expenses and the Pro Forma Financial Statements

Selling and administrative expenses are not inventoried and are budgeted as period costs. Budgeted selling and administrative expenses are matched in their entirety against budgeted sales.

Question 1**CPA-05829**

Which of the following listings correctly describes the order in which the four types of budgets must be prepared?

- a. Production, direct materials purchases, sales, cash disbursements.
- b. Sales, production, direct materials purchases, cash disbursements.
- c. Cash disbursements, direct materials purchases, production, sales.
- d. Sales, direct materials purchases, production, cash disbursements.

[Answer](#) [Explanation](#)**Question 2****CPA-04793**

Johnson Co. is preparing its master budget for the first quarter of next year. Budgeted sales and production for one of the company's products are as follows:

<u>Month</u>	<u>Sales</u>	<u>Production</u>
January	10,000	12,000
February	12,000	11,000
March	15,000	16,000

Each unit of this product requires 4 pounds of raw materials. Johnson's policy is to have sufficient raw materials on hand at the end of each month for 40 percent of the following month's production requirements. The January 1 raw materials inventory is expected to conform with this policy.

How many pounds of raw materials should Johnson budget to purchase for January?

- a. 11,600
- b. 46,400
- c. 48,000
- d. 65,600

[Answer](#) [Explanation](#)



1 Financial Budgets: Cash Budgets

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Cash budgets represent detailed projections of cash receipts and disbursements. The cash budget is derived from other budgets based on cash collection and disbursement assumptions. Cash budgets provide management with information regarding the availability of funds for distribution to owners, for repayment of debt, and for investment. Cash budgets are generally divided into three major sections:

- Cash available
- Cash disbursements
- Financing

1.1 Cash Available

Cash available for use by the organization is normally associated with both balances available at the beginning of the period and cash collections.

1.1.1 Cash Balances

Cash balances are the amounts of cash on hand that can be used to liquidate expenses. Cash balances that are available for use are limited by management policies relative to minimum cash on hand and compensating balance agreements.

1.1.2 Cash Collections

Cash collection budgets specify the amounts of cash that will be received from sales, based on the sales budget and from anticipated loan proceeds.

- Cash collection budgets set standards for collections based on current-period sales (usually monthly) and prior-period sales (also usually monthly).
- Cash collection budgets make assumptions regarding the percentage of credit sales and the speed at which those collections will occur.

Example 1**Cash Collections**

Facts: Beck-Con Inc. is a U.S. retailer creating its cash budget for September. Based on historical data, it assumes the following information regarding collections:

- 80 percent of credit sales collected in the next month after sale.
- 18 percent of credit sales collected in the second month after sale.
- The remaining 2 percent will not be collected.

Month	Type	Sales Dollars
July	Credit	\$850,000
August	Credit	\$925,000
September	Credit	\$700,000
September	Cash	\$170,000

Required: Calculate cash collections for September.

Solution:

July credit sales ($\$850,000 \times 18\%$)	\$ 153,000
+ August credit sales ($\$925,000 \times 80\%$)	740,000
+ September cash sales	<u>170,000</u>
Total cash collections	<u><u>\$1,063,000</u></u>

1.2 Cash Disbursements

Cash disbursements budgets represent the cash outlays associated with purchases and with operating expenses.

1.2.1 Purchases

Cash disbursements budgets (for purchases) indicate the amount that is expected to be paid for *purchases*.

- Cash disbursements budgets include:
 - Cash purchases for the current period (generally the current month).
 - Credit purchases (accounts payable) for the current period.
 - Cash disbursements required to pay accounts payable during the current period.
- Cash disbursements budgets are developed using the percentage of goods bought on credit, the age of payables liquidated, and the percentage of goods purchased for cash.

1.2.2 Operating Expenses

Cash disbursements budgets (for operating expenses) specify the amounts paid out to defray the costs of *operating expenses*.

- Cash disbursements budgets eliminate noncash operating expenses (such as depreciation).
- Cash disbursements budgets include:
 - Percentage of prior month expenses to be paid in the current month.
 - Current month expenses for which disbursement is deferred until the following month.
 - Current month expenses paid in cash in the current month.
- Cash disbursements consider the effect of accounts payable (other operating expenses) and accrued payroll (wages).

Example 2

Cash Disbursements

Facts: To forecast its cash disbursements for September, Beck-Con divided its outflows into the following categories:

Cost Category	Applicable Dollar Amounts
Direct materials	\$425,000 to be purchased in August, payable in September
Direct labor	\$310,000 to be incurred and payable in September
Overhead	\$150,000 in actual costs to be incurred and payable in September
Operating expenses	\$145,000 in actual costs to be incurred and payable in September
Capital expenditures	\$120,000 (from the capital expenditure budget)
Tax payments	None in September
Dividends	\$35,000 payable in September, for the last quarter of the fiscal year

Required: Calculate Beck-Con's cash disbursements for September.

Solution: September cash disbursements are calculated as follows:

Direct materials	\$ 425,000
+ Direct labor	310,000
+ Overhead	150,000
+ Operating expenses	145,000
+ Capital expenditures	120,000
+ Dividends	<u>35,000</u>
Total cash disbursements	<u>\$1,185,000</u>

1.3 Financing

Financing budgets consider the manner in which operating (line of credit) financing will be used to maintain minimum cash balances or the manner in which excess or idle cash will be invested to ensure liquidity and adequate returns.

Illustration 1 Financing Budget

Beck-Con forecasts a beginning cash balance for September 1 of \$80,000. The company would like to ensure that the ending cash balance is at least \$50,000. In order to accomplish this, it plans to borrow \$95,000 at the end of September from its established line of credit at an annual interest rate of 6 percent. The first interest payment would not be due until October 31.

1.4 Cash Budget Formats

Cash budgets represent statements of planned cash receipts and disbursements and are primarily affected by the amounts used in the budgeted income statement. Cash budgets consider:

- Beginning cash
- Cash collections from sales (add)
- Cash disbursements for purchases and operating expenses (subtract)
- Computed ending cash
- Cash requirements to sustain operations (subtract)
- Working capital loans to maintain cash requirements

Example 3 Combined Cash Budget

Facts: Beck-Con's cash budget includes a beginning balance of \$80,000; cash collections of \$1,063,000; cash payments of \$1,185,000; and a letter of credit borrowing of \$95,000.

Required: Prepare the cash budget that will allow the company to end September with a cash balance of \$53,000.

Solution:

Beginning cash balance:	\$ 80,000
+ Cash collections	<u>1,063,000</u>
Total cash available	1,143,000
Less cash payments:	<u>(1,185,000)</u>
Ending cash balance (before financing)	\$ (42,000)
Financing:	
Borrowings	\$ 95,000
Interest payments	0
Repayments	<u>0</u>
Ending cash balance	<u>\$ 53,000</u>

2 Financial Budgets: Pro Forma Financial Statements

2.1 Pro Forma Income Statement

Key components of the budgeted income statement include the data described in the operating budgets:

- Sales budget
- Cost of goods sold budget (derived from the production budgets)
- Selling and administrative expense budget
- Interest expense budget (taken from the cash budget)

2.2 Pro Forma Balance Sheet

Budgeted balance sheets display the balances of each balance sheet account in a manner consistent with the income statement and cash budget plans developed above. Balance sheet accounts are adjusted for the cash collections and disbursements associated with the cash budget and the noncash transactions accounted for in the income statement.

2.3 Pro Forma Statement of Cash Flows

The budgeted statement of cash flows is derived from the budgeted income statement, the current and previous budgeted balance sheets, and then reconciled to the cash budget. Cash budgeting has the benefits of displaying the cash effects of the master budget on actual cash flows, assisting in the determination of whether additional sources of financing are required, and evaluating the optimal use of trade credit.

Example 4

Pro Forma Income Statement

Facts: The CFO for Packer Company is creating a pro forma income statement for the upcoming fiscal year. The estimated current-year income statement shows:

Sales	\$500,000
Cost of goods sold	(320,000)
SG&A	(60,000)
Interest expense	<u>(20,000)</u>
Pretax profit (EBT)	<u>\$100,000</u>

For the next fiscal year, the CFO forecasts the following:

- Sales growth of 5 percent.
- An inventory increase of \$25,000, along with projected cost of goods manufactured of \$365,000.
- An increase in SG&A expenses of \$10,000.
- A pay down of a substantial amount of debt, reducing interest expense by \$15,000.

(continued)

(continued)

Required: Create a pro forma income statement for the upcoming fiscal year.

Solution:

Sales	\$525,000	5 percent growth over prior year's \$500,000.
Cost of goods sold	(340,000)	COGM of \$365,000—Increase in inventory balance of \$25,000.
SG&A	(70,000)	Increase of \$10,000 over prior year's \$60,000.
Interest expense	(5,000)	Decrease of \$15,000 over prior year's \$20,000.
Pretax profit (EBT)	<u>\$110,000</u>	Overall \$10,000 increase over prior year's \$100,000.

3 Capital Budgets

Capital purchases budgets identify and allow management to evaluate the capital additions of the organization, often over a multiyear period. Financing is a significant component of the capital purchases budget. Capital budgets detail the planned expenditures for capital items (e.g., facilities, equipment, new products, and other long-term investments). Capital budgets are highly dependent on the availability of cash or credit, and they generally involve long-term commitments by the organization.

3.1 Pro Forma Balance Sheet

Planned additions of capital equipment and related debt from the capital budget are added to the balance sheet.

3.2 Pro Forma Income Statement

Planned additions of capital equipment are considered in developing budgeted depreciation expense; interest expense associated with planned financing is included as an expense.

3.3 Cash Budget

Planned financing expenses and principal repayments are included as disbursements on the cash budget.

4 Flexible Budgeting

A *flexible budget* is a financial plan prepared in a manner that allows for adjustments for changes in production or sales and accurately reflects expected costs for the adjusted output. Analysis focuses on substantive variances from standards rather than just simple changes in volume or activity. Flexible budgets represent adjustable economic models that are designed to predict outcomes and accommodate changes in actual activity. Revenues and expenses are adjusted to display anticipated levels for achieved outputs.

4.1 Assumptions and Uses

Flexible budgets include consideration of revenue per unit, variable costs per unit, and fixed costs over the relevant range within which the relationship between revenues and variable costs will remain unchanged and fixed costs will remain stable.

4.1.1 Yield

Flexible budgets consider the amount of cost per unit allowed for units of output.

4.1.2 Variance Analysis

Flexible budgets derive the expenses and revenues allowed from the output achieved for purposes of comparison to actual activity and performance evaluation.

4.2 Benefits and Limitations of the Flexible Budget

4.2.1 Benefits

Flexible budgets can display different volume levels within the relevant range to pinpoint areas in which efficiencies have been achieved or waste has occurred.

4.2.2 Limitations

Flexible budgets are highly dependent on the accurate identification of fixed and variable costs and the determination of the relevant range.

Example 5

Flexible Budgeting

Facts: The Flex-o-matic Corp. produces the Flex-o-matic, a piece of exercise equipment. Corporate Controller Felix Flexmeister is developing a flexible budget. Felix has already developed a master budget but estimates that the relevant range extends 20 percent above and below the master budget.

Required: Calculate income over the relevant range in dollars assuming a selling price of \$60 per unit, variable costs of \$40 per unit, fixed costs of \$100,000, and anticipated output according to the master budget of 5,000 units.

Solution:

	80% of Master	Master Budget	120% of Master
Sales	\$240,000	\$300,000	\$360,000
Variable costs	<u>(160,000)</u>	<u>(200,000)</u>	<u>(240,000)</u>
Contribution margin	80,000	100,000	120,000
Fixed costs	<u>(100,000)</u>	<u>(100,000)</u>	<u>(100,000)</u>
Operating income	<u>\$ (20,000)</u>	<u>\$ 0</u>	<u>\$ 20,000</u>

Question 1

CPA-03813

The basic difference between a master budget and a flexible budget is that a master budget is:

- a. Only used before and during the budget period and a flexible budget is only used after the budget period.
- b. For an entire production facility and a flexible budget is applicable to single departments only.
- c. Based on one specific level of production, and a flexible budget can be prepared for any production level within a relevant range.
- d. Based on a fixed standard and a flexible budget allows management latitude in meeting goals.

Answer Explanation

Question 2**CPA-05867**

A company's controller is adjusting next year's budget to reflect the effect of an expected 5 percent inflation rate. Listed below are selected items from next year's budget before the adjustment:

Total salaries expense	\$250,000
Health costs	100,000
Depreciation expense	65,000
Interest expense on 10-year fixed-rate notes	37,750

After adjusting for the 5 percent inflation rate, what is the company's total budget for the selected items before taxes for next year?

- a. \$470,250
- b. \$472,138
- c. \$473,500
- d. \$475,388

Answer Explanation



RT

1 Actual vs. Plan

Click to view

Variance analysis is a tool for comparing some measure of performance to a plan, budget, or standard for that measure. Variance analysis is used for planning and control purposes, and can be used to evaluate revenues and costs. Comparison of actual results to the annual business plan is the first and most basic level of control and evaluation of operations.

1.1 Performance Report

Actual results may be easily compared with budgeted results. However, usefulness is limited by the existence of budget variances that may be strictly related to volume.

Example 1

Budget vs. Plan Performance Report

Facts: Neostar Corporation has prepared its annual business plan for Year 1. The organization anticipated that it would sell 10,000 units of its product at \$15 apiece, that its contribution margin percentage would be 20 percent, and that its fixed costs would be \$25,000. Actual units sold numbered only 8,000 (totaling \$112,000 in revenue); variable expenses materialized at \$100,800 and fixed costs materialized at \$24,000.

Required: Prepare a performance report comparing actual versus budgeted results.

Solution:

	Budget	Actual	Variance	
Revenue	\$150,000	\$112,000	(\$38,000)	Unfavorable
Variable expenses	(120,000)	(100,800)	19,200	Favorable
Contribution margin	30,000	11,200	(18,800)	Unfavorable
Fixed costs	(25,000)	(24,000)	1,000	Favorable
Operating income	\$ 5,000	\$ (12,800)	\$(17,800)	Unfavorable

Variances need significant analysis before they are useful. The favorable variance in variable expenses, for example, does not represent efficiencies. Budgeted contribution margin ratios are 20 percent; actual contribution margin ratios are 10 percent. Sales in units were off budget by 20 percent, yet revenue was down by 25 percent. Something is very wrong at Neostar, but what?

1.2 Use of Flexible Budgets to Analyze Performance

Budget variance analysis becomes progressively more sophisticated as managers review flexible budget comparisons. The flexible budget allows managers to identify how an individual change in a cost or revenue driver affects the overall cost of a process.

Example 2

Flexible Budget Performance Report

Facts: Management at Neostar has heard that flexible budgeting can provide more meaningful information.

Required: Prepare a flexible budget using the same information described in Example 1.

Solution:

Neostar Corporation
Flexible Budget Performance Report
For the year ended December 31, Year 1

	Actual Results @ Actual	Flexible Budget Variances	Flexible Budget @ Actual (Planned Cost)	Sales Activity (Volume) Variances	Master Budget
Units	8,000		8,000		10,000
Sales	\$112,000	\$ (8,000)	\$120,000	(\$30,000)	\$150,000
Variable costs	(100,800)	(4,800)	(96,000)	24,000	(120,000)
Contribution margin	11,200	(12,800)	24,000*	(6,000)	30,000*
Fixed costs	(24,000)	1,000	(25,000)	—	(25,000)
Operating income	<u>\$ (12,800)</u>	<u>\$ (11,800)</u>	<u>\$ (1,000)</u>	<u>\$ (6,000)</u>	<u>\$ 5,000</u>
Flexible budget variances			(11,800)		
Sales activity (volume) variances				(6,000)	
Total master budget variances					(17,800)

$$*24,000 / 120,000 = 20\%$$

$$30,000 / 150,000 = 20\%$$

Flexible budget variances show that revenue per unit was less than expected and variable costs per unit were greater than expected. The company has performed \$11,800 worse than expected. Meanwhile, differences in volume produced a \$6,000 unfavorable variance, yielding a total variance from the budget of \$17,800.

Although we still do not know what is wrong with Neostar, we know where to look. Revenue is not materializing as expected despite efforts to discount our selling price (producing an unfavorable sales price variance of \$8,000), and expenses are over budget (producing an unfavorable variable cost variance of \$4,800 despite a favorable fixed-cost variance of \$1,000).

2 Variance Analysis Using Standards

Variance analysis becomes increasingly sophisticated as the investigation of differences between budgeted and actual performance moves from the aggregate examinations associated with either performance reporting or flexible budget analysis to the computation of per-unit variances normally associated with the use of standard costing systems.

2.1 Standard Costing Systems

Standard costing systems are the most common cost-measurement systems. Standard costs, in the aggregate, measure the costs the firm expects that it *should* incur during production. In a standard costing system, standard costs are used for all manufacturing costs (i.e., raw materials, direct labor, and manufacturing overhead).

2.1.1 Calculations

- **Direct Costs**

$$\text{Standard direct costs} = \text{Standard price} \times \text{Standard quantity}$$

- **Indirect (Overhead) Costs**

$$\text{Standard indirect costs} = \text{Standard (predetermined) application rate} \times \text{Standard quantity}$$

2.1.2 Purposes of Standard Costing Systems

- Cost control
- Data for performance evaluations (variance analysis)
- Ability to learn from standards and improve various processes

2.2 Variance Calculations Using Standards

2.2.1 Standard Cost Objectives

The objective of using a standard costing system is to attain a realistic predetermined or budgeted cost for use in planning and decision making. It also greatly simplifies bookkeeping procedures.

2.2.2 Evaluating Variances From Standard

The differences between actual amounts and standard amounts are called variances.

- **Evaluating Results:** An actual cost lower than standard cost is called a *favorable* variance, and an actual cost higher than standard cost is called an *unfavorable* variance.
- **Evaluating Control:** If a variance from standard could have been prevented, it is called a controllable variance; if not, the variance is known as an *uncontrollable* variance.

2.2.3 Product Costs Subject to Variance Analysis

Product costs generally consist of direct materials, direct labor, and manufacturing overhead. A favorable or unfavorable variance in total is a composite of a number of variances. Variances are typically calculated for the following cost elements:

- Direct materials (DM)
- Direct labor (DL)
- Variable manufacturing overhead (VOH)
- Fixed manufacturing overhead (FOH)

2.3 Direct Materials and Direct Labor Variance

For direct materials and direct labor, two variances are typically calculated: a price (or rate) variance and a quantity (or efficiency) variance. The variance calculations may be approached in either an equation or a tabular format. Both are presented below:

2.3.1 Equation Format

$$\text{DM price variance} = \text{Actual quantity purchased} \times (\text{Actual price} - \text{Standard price})$$

$$\text{DM quantity usage variance} = \text{Standard price} \times (\text{Actual quantity used} - \text{Standard quantity allowed})$$

$$\text{DL rate variance} = \text{Actual hours worked} \times (\text{Actual rate} - \text{Standard rate})$$

$$\text{DL efficiency variance} = \text{Standard rate} \times (\text{Actual hours worked} - \text{Standard hours allowed})$$

Materials and labor variances are expense variances. When actual price/rate or actual quantity/hours exceed standards, variances are unfavorable. If standards exceed actuals, variances are favorable.

2.3.2 Tabular Format

The variance is computed by comparing two totals. If a figure on the left (actual) is larger than a figure on the right (standard), then the variance is unfavorable; if the figure on the left is smaller, the variance is favorable. The specific variances follow:

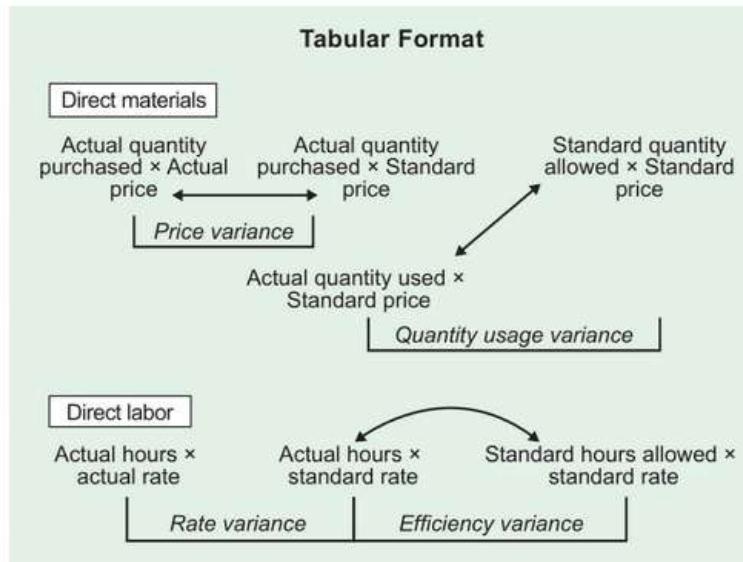


Illustration 1 Materials Variances Using Equation and Tabular Formats

Actual quantity purchased	200 units
Actual quantity used	110 units
Units standard quantity	100 units
Actual price paid	\$8 per unit
Standard price	\$10 per unit

$$\begin{aligned} \text{DM price variance} &= \text{AQ}_{\text{purchased}} \times (\text{AP} - \text{SP}) \\ &= 200 \text{ units} \times (\$8/\text{unit} - \$10/\text{unit}) \\ &= \$400 \text{ Favorable} \end{aligned}$$

$$\begin{aligned} \text{DM quantity variance} &= \text{SP} \times (\text{AQ}_{\text{used}} - \text{SQ}_{\text{allowed}}) \\ &= \$10/\text{unit} \times (110 \text{ units} - 100 \text{ units}) \\ &= \$100 \text{ Unfavorable} \end{aligned}$$

Actual quantity purchased × Actual price	Actual quantity purchased × Standard price	Standard quantity allowed × Standard price
200 × \$8 = \$1,600	200 × \$10 = \$2,000	100 × \$10 = \$1,000
Price variance = \$400 F		
Actual quantity used × Standard price		

Quantity usage variance
110 × \$10 = \$1,100
= \$100 U

Illustration 2 Labor Variances Using Equation and Tabular Formats

Actual hours worked	450 hours
Standard hours	500 hours
Actual paid rate	\$20 per hour
Standard rate	\$15 per hour

$$\begin{aligned} \text{DL rate variance} &= \text{AH}_{\text{worked}} \times (\text{AR} - \text{SR}) \\ &= 450 \text{ hours worked} \times (\$20/\text{hour} - \$15/\text{hour}) \\ &= \$2,250 \text{ Unfavorable} \end{aligned}$$

$$\begin{aligned} \text{DL efficiency variance} &= \text{SR} \times (\text{AH}_{\text{worked}} - \text{SH}_{\text{allowed}}) \\ &= \$15/\text{hour} \times (450 \text{ hours worked} - 500 \text{ hours allowed}) \\ &= \$750 \text{ Favorable} \end{aligned}$$

Actual hours × Actual rate	Actual hours × Standard rate	Standard hours allowed × Standard rate
450 × \$20 = \$9,000	450 × \$15 = \$6,750	500 × \$15 = \$7,500
Rate variance = \$2,250 U		Efficiency variance = \$750 F

2.4 Manufacturing Overhead Variance

At a high level, the analysis of manufacturing overhead compares the actual overhead incurred in a period to the applied overhead in that same period. Overhead is estimated and applied based on a predetermined overhead application rate.

2.4.1 Underapplied and Overapplied Overhead

If the actual amount of overhead incurred in the period exceeds the amount applied, overhead will be considered underapplied and the overhead account will have a net debit balance. This will result in an unfavorable variance because the actual amount of overhead incurred is higher than expected.

If the actual amount of overhead incurred is less than the amount applied, overhead will be considered overapplied and the overhead account will have a net credit balance. The variance will be favorable because the actual overhead incurred is less than expected.

2.4.2 Variable and Fixed Overhead Variances

The overall manufacturing overhead variance can be broken into variable and fixed overhead variances. The variable overhead (VOH) variance can be further broken into a rate (spending) variance and an efficiency variance. The fixed overhead (FOH) variance can be divided into a budget (spending) variance and a volume variance. Although the variable and fixed overhead spending variances can be combined for calculation purposes, they serve different functions from a strategic/analytical perspective.



Pass Key

The equations for the four overhead variances are as follows:

- VOH rate (spending) variance = Actual hours × (Actual rate – Standard rate)
- VOH efficiency variance = Standard rate × (Actual hours – Standard hours allowed for actual production volume)
- FOH budget (spending) variance = Actual fixed overhead – Budgeted fixed overhead
- FOH volume variance = Budgeted fixed overhead – Standard fixed overhead cost allocated to production*

*Based on Actual production × Standard rate

6

2.4.3 Establishing Overhead Application Rates

Overhead rates are applied using various cost drivers that most appropriately assign the components of overhead cost pools to production. Predetermined fixed and variable overhead rates are established by dividing planned fixed and variable overhead amounts by a suitable cost driver.

2.4.4 Application of Overhead

Overhead is applied to production based on the predetermined rate per cost driver times the standard cost driver allowed for the actual level of activity (hours worked, units produced, etc.).



Pass Key

When standard costing is used, the application of overhead is accomplished in two steps:

- **Step 1:** Calculated overhead rate = Budgeted overhead costs ÷ Estimated cost driver
 - **Step 2:** Applied overhead = Standard cost driver for actual level of activity × Overhead rate (from Step 1)

2.4.5 Interpretation

Overhead variances represent the analysis of balance in the overhead account after overhead has been applied. Overapplied overhead (more credit) is favorable, as it will ultimately result in a credit to cost of goods sold at the end of the period and therefore a reduction in expenses (and increase in profits). Underapplied (more debit) is unfavorable, as the eventual debit to cost of goods sold will increase expenses and therefore decrease profits. Each component of the variance computation follows the same logic.

- If the number on the right is greater than the number on the left (more credit), then the variance is favorable.
 - If the number on the left is greater than the number on the right (more debit), then the variance is unfavorable.
 - The sum of all variances equals the net balance in the overhead account.

2.4.6 Variable Manufacturing Overhead Variances

- #### ■ Variable Overhead Rate (Spending) Variance

VOH rate (spending) variance = Actual hours × (Actual rate - Standard rate)

This variance tells managers whether more or less was spent on variable overhead than expected. A favorable variance occurs when the standard rate exceeds the actual rate, which is beneficial to a company because it means that it paid less per labor hour than anticipated. An unfavorable variance occurs when the actual rate exceeds the standard rate, which means that the company paid more per labor hour than it expected to spend.

- #### ■ Variable Overhead Efficiency Variance

$$\text{VOH efficiency variance} = \text{Standard rate} \times (\text{Actual hours} - \text{Standard hours allowed for actual production volume})$$

This variance is tied to the efficiency with which labor hours are utilized. The efficiency variance isolates the amount of total variable overhead variance that is due to using more or fewer direct labor hours than what was budgeted (assuming that direct labor hours is the cost driver). In other words, given what was produced in terms of output, did it require more or fewer labor hours than anticipated? A favorable variance results from using fewer labor hours than budgeted, and an unfavorable variance stems from using more labor hours than budgeted.

2.4.7 Fixed Manufacturing Overhead Variances

■ Fixed Overhead Budget (Spending) Variance

$$\text{FOH budget (spending) variance} = \frac{\text{Actual fixed overhead}}{} - \frac{\text{Budgeted fixed overhead}}{}$$

Companies budget an amount for fixed overhead costs every period, and this variance focuses at a high level on whether more or less was spent than budgeted. All of the actual fixed overhead costs are summed for the period and the total actual overhead is compared with the budgeted amount of fixed overhead. A favorable variance occurs when actual fixed overhead costs are less than budgeted, and an unfavorable variance results from actual fixed overhead costs exceeding the budgeted amount.

■ Fixed Overhead Volume Variance

$$\text{FOH volume variance} = \frac{\text{Budgeted fixed overhead}}{} - \frac{\text{Standard fixed overhead cost allocated to production}^*}{}$$

*Based on actual production \times Standard rate

Fixed overhead costs are typically applied using a rate derived from budgeted fixed overhead costs and expected volume (the cost driver). When the actual volume produced differs from the amount used to calculate the fixed overhead application rate, there will be a variance. A favorable variance occurs when volume is higher than anticipated, which implies that more units were produced using the same amount of fixed resources. An unfavorable variance occurs when volume is lower than anticipated, as fewer units were produced using a fixed amount of resources.

Example 3

Manufacturing Overhead Variance

Facts: Lucy Inc. produces widgets and applies overhead costs based on direct labor hours. The table below provides budgeted and actual information on the number of widgets, labor hours, variable overhead costs, and fixed overhead costs for January.

Required: Using this information, calculate the rate and efficiency variable overhead variances, the budget and volume fixed overhead variances, and the overall overhead variance.

(continued)

(continued)

Solution:

Number of Widgets		
Budgeted number of widgets	4,000 widgets	
Actual number of widgets	3,800 widgets	
Labor Hours		
Standard labor hours required per widget	1.00 labor hour	
Standard labor hours total (based on actual production)	3,800 hours	(3,800 widgets × 1.00 labor hour per widget)
Actual labor hours used	3,900 hours	
Variable Overhead		
Standard VOH Rate	\$1.50 per hour	
Actual VOH Rate	\$1.60 per hour	
Actual VOH Costs	\$6,240	(3,900 hours × \$1.60 per hour)
Fixed Overhead		
Standard FOH per widget	\$3.00 per hour	
Budgeted FOH Costs	\$12,000	(4,000 budgeted widgets × 1.00 labor hour per widget × \$3.00 per hour)
Actual FOH Costs	\$10,560	

VOH rate (spending): 3,900 hours × (\$1.60 – \$1.50) = \$390 Unfavorable**VOH efficiency:** \$1.50 × [3,900 hours – (3,800 × 1.00 hour)] = \$150 Unfavorable**FOH budget (spending):** \$10,560 – \$12,000 = \$1,440 Favorable**FOH volume:** \$12,000 – *\$11,400 = \$600 Unfavorable

*3,800 hours budgeted (for production of 3,800 widgets) × \$3 per hour

Adding all of the variances produces a total overall favorable variance of \$300: \$390U + \$150U – \$1,440F + \$600U = \$300F**Overall variance:** \$16,800 actual – \$17,100 applied = \$300 Favorable**Actual overhead (FOH + VOH):** \$16,800

Actual FOH: \$10,560

Actual VOH: \$6,240

Applied overhead (FOH + VOH): \$17,100

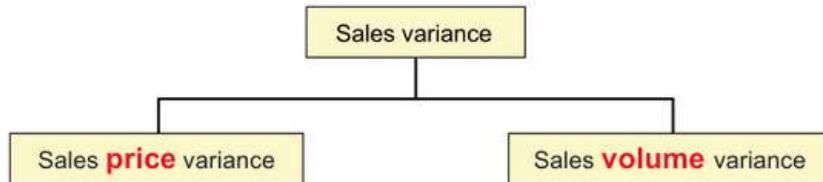
Applied FOH: \$11,400 [3,800 standard labor hours (to produce 3,800 widgets) × \$3.00 per hour]

Applied VOH: \$5,700 [3,800 standard labor hours (to produce 3,800 widgets) × \$1.50 per hour]

Interpretation	Driver
<ul style="list-style-type: none"> Spending (VOH and FOH) <ul style="list-style-type: none"> — VOH rate: \$390 Unfavorable — FOH budget: \$1,440 Favorable 	VOH rate was higher than anticipated Spent less than anticipated on FOH
<ul style="list-style-type: none"> Efficiency (VOH only) <ul style="list-style-type: none"> — VOH efficiency: \$150 Unfavorable 	Took longer per unit than anticipated
<ul style="list-style-type: none"> Volume (FOH only) <ul style="list-style-type: none"> — FOH volume: \$600 Unfavorable 	Produced fewer units than budgeted

2.5 Sales and Contribution Margin Variances

Sales and contribution margin variance analyses can be used to evaluate the effectiveness of an entity's identification of target markets and its strategies to capture those markets. The sales variance (the difference between actual sales revenue and budgeted sales revenue) has various components, as described below.



2.5.1 Sales Price Variance (or Sales Revenue Flexible Budget Variance)

The *sales price variance* measures the aggregate effect of a selling price different from the budget.

$$\text{Sales price variance} = \left[\frac{\text{Actual SP}}{\text{Unit}} - \frac{\text{Budgeted SP}}{\text{Unit}} \right] \times \text{Actual sold units}$$

- **Strategy and Mission:** Firms might reduce prices in an effort to move into a cost leadership strategy or increase prices in an effort to put a differentiation strategy into place. Variance results have specific implications in analyzing the effectiveness of a firm in reaching its target markets.
- **Interpretation:** A favorable variance in price (the actual sales price exceeds the budgeted sales price) can result in untapped profit potential for a firm. If a firm plans to increase its market share or sales volume simply by reducing sales prices, however, it can risk reducing the profitability of the firm if the expected volume increase is not enough to cover the reduction in price.

Example 4

Sales Price Variance

Facts: In Cascade Company's January budget, the company shows 3,000 budgeted units sold, a sale price of \$16 per unit, and variable costs of \$10 per unit. The company actually sells 4,000 units at a price of \$14 per unit.

Required: Calculate Cascade's sales price variance for January.

Solution: Sales price variance = $(\$14 - \$16) \times 4,000 = \$8,000$ unfavorable. This variance is unfavorable because the per-unit selling price was less than anticipated.

2.5.2 Sales Volume Variance

The *sales volume variance* is a flexible budget variance that distills volume activity from other sales performance components. The basic sales volume variance is:

$$\text{Sales volume variance} = \left[\frac{\text{Actual sold units}}{\text{sales units}} - \frac{\text{Budgeted}}{\text{sales units}} \right] \times \text{Standard contribution margin per unit}$$

A favorable variance exists when more units are sold than budgeted, and an unfavorable variance occurs when budgeted units exceed actual units.

Example 5**Sales Volume Variance**

Facts: In Cascade Company's January budget, the company shows 3,000 budgeted units sold, a sale price of \$16 per unit, and variable costs of \$10 per unit. The company actually sells 4,000 units at a price of \$14 per unit.

Required: Calculate Cascade's sales volume variance for January.

Solution: Sales volume variance = $(4,000 - 3,000) \times \$6 = \$6,000$ Favorable. This variance is favorable because the company sold more units than it anticipated.

Question 1**CPA-03836**

The standard direct material cost to produce a unit of Lem is 4 meters of material at \$2.50 per meter. During May of the current year, 4,200 meters of material costing \$10,080 were purchased and used to produce 1,000 units of Lem. What was the material price variance for May?

- a. \$400 favorable
- b. \$420 favorable
- c. \$80 unfavorable
- d. \$480 unfavorable

Answer Explanation**Question 2****CPA-05251**

A company produces widgets with budgeted standard direct materials of 2 pounds per widget at \$5 per pound. Standard direct labor was budgeted at 0.5 hour per widget at \$15 per hour. The actual usage in the current year was 25,000 pounds and 3,000 hours to produce 10,000 widgets. What was the direct labor usage variance?

- a. \$25,000 favorable
- b. \$25,000 unfavorable
- c. \$30,000 favorable
- d. \$30,000 unfavorable

Answer Explanation

Question 3**CPA-05874**

A company uses a standard costing system. At the end of the current year, the company provides the following overhead information:

Actual overhead incurred:

Variable	\$90,000
Fixed	62,000
Budgeted fixed overhead	65,000
Variable overhead rate (per direct labor hour)	8
Standard hours allowed for actual production	12,000
Actual labor hours used	11,000

What amount is the variable overhead efficiency variance?

- a. \$8,000 favorable
- b. \$8,000 unfavorable
- c. \$6,000 favorable
- d. \$2,000 unfavorable

[Answer Explanation](#)
Question 4**CPA-03831**

Baby Frames Inc. evaluates manufacturing overhead by using variance analysis. The following information applies to the month of May:

	<u>Actual</u>	<u>Budgeted</u>
Number of frames manufactured	19,000	20,000
Variable overhead costs	\$ 4,100	\$ 2 per direct labor hour
Fixed overhead costs	22,000	20,000 \$1 per unit
Direct labor hours	2,100 hours	0.1 hour per frame

What is the production volume variance?

- a. \$1,000 favorable
- b. \$1,000 unfavorable
- c. \$2,000 favorable
- d. \$2,000 unfavorable

[Answer Explanation](#)

Question 3**CPA-05874**

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- b. \$8,000 unfavorable
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- d. \$2,000 unfavorable

[Answer Explanation](#)
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What is the production volume variance?

- a. \$1,000 favorable
- b. \$1,000 unfavorable
- c. \$2,000 favorable
- d. \$2,000 unfavorable

[Answer Explanation](#)



RT

1 Economics

Click to view

Economics is defined as a science that studies human behavior as the relationship between ends and scarce means that have alternative uses. In essence, economics is about people (e.g., individuals, corporations, governments) and the choices they make. Because economics is a crucial component of the business environment which ultimately affects an individual's, company's, or government's performance (and financial reporting), it is considered an important area of study in the Business Environment and Concepts (BEC) curriculum.

2 Business Cycles

2.1 Introduction

Business cycles refer to the rise and fall of economic activity relative to long-term growth trends (i.e., the swings in total national output, income, and employment over time). Although the economy tends to grow over time, the growth in economic activity is not stable. Rather, economic activity is characterized by fluctuations, and these fluctuations are known as business cycles. Business cycles vary in duration and severity. The analysis of business cycles is part of the field of macroeconomics. Macroeconomics is the study of the economy as a whole. It examines the determinants of national income, unemployment, inflation, and how monetary and fiscal policies affect economic activity.

2.2 Measuring Economic Activity (Gross Domestic Product)

Because business cycles refer to the rise and fall of economic activity, it is important to first examine how economic activity is measured. The most common measure of the economic activity or output of an economy is gross domestic product (GDP). GDP is the total market value of all final goods and services produced within the borders of a nation in a particular period. The term "final goods and services" *excludes used* goods that have been resold; GDP is the nation's output of goods and services. Note that GDP includes all final goods and services produced by resources *within* a country regardless of who owns the resources. Thus, U.S. GDP includes the output of foreign-owned factories in the United States but excludes the output of U.S.-owned factories operating abroad.

2.3 Nominal vs. Real GDP

2.3.1 Nominal GDP

Nominal GDP (unadjusted) measures the value of all final goods and services in prices prevailing at the time of production. That is, nominal GDP measures the value of all final goods and services in current prices.

2.3.2 Real GDP

Real GDP (adjusted) measures the value of all final goods and services in constant prices. That is, real GDP is adjusted to account for changes in the price level (i.e., it removes the effects of inflation by using a price index). Real GDP is the most commonly used measure of economic activity and national output (i.e., the total output of an economy).

The price index used to calculate real GDP is called the GDP deflator. It is a price index for all goods and services included in GDP. Using the GDP deflator, real GDP is calculated as the ratio of nominal GDP to the GDP deflator times 100.

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP deflator}} \times 100$$

Example 1

Application of Price Index to Determine Real GDP

Facts: Assume that a local economist is attempting to measure an economy's real GDP and the change in real GDP from the prior year. Based on his research, the following economic data is gathered on the economy's production:

	Current Year	Prior Year
Nominal GDP (\$ billions)	\$3,450.3	\$3,286.0
GDP deflator	107.0	105.0

Required: Using the table above, calculate the real GDP for the current year and prior year and the change in real GDP for the economy.

Solution: The following formula is used to measure real GDP:

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP deflator}} \times 100$$

$$\begin{aligned}\text{Current year} &= \frac{\$3,450.3}{107.0} \times 100 \\ &= \$3,224.6 \text{ billion}\end{aligned}$$

$$\begin{aligned}\text{Prior year} &= \frac{\$3,286.0}{105.0} \times 100 \\ &= \$3,129.5 \text{ billion}\end{aligned}$$

The following formula is used to measure the change in real GDP:

$$\begin{aligned}\% \Delta \text{ Real GDP} &= \frac{\text{Current year real GDP}}{\text{Past year real GDP}} - 1 \\ &= \frac{\$3,224.6}{\$3,129.5} - 1 \\ &= +3.04\%\end{aligned}$$

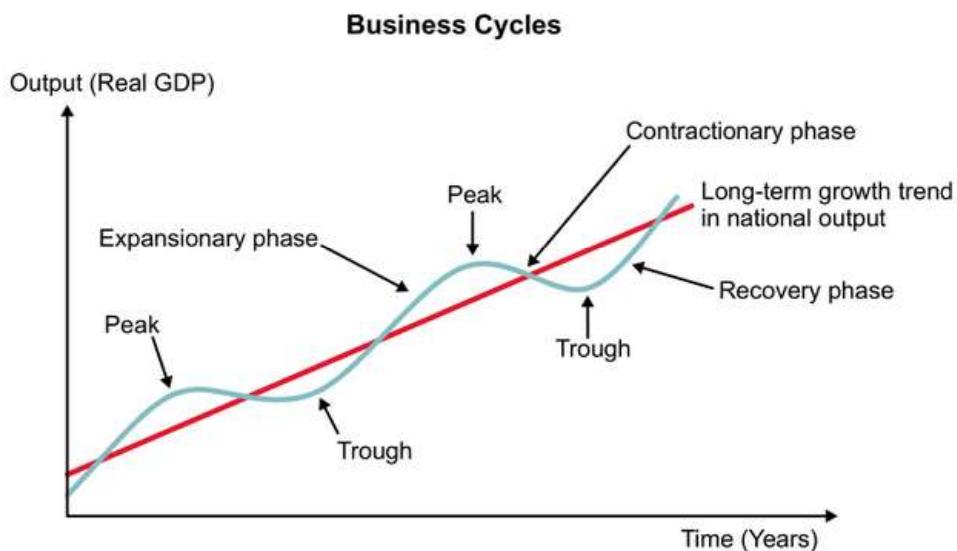
2.3.3 Real GDP per Capita and Economic Growth

Real GDP per capita is real GDP divided by population. Real GDP per capita is typically used to compare standards of living across countries or across time. Real GDP per capita is also used to measure economic growth. Economic growth is the increase in real GDP per capita over time.

2.4 Summary Composition of Business Cycles

As noted previously, economic activity is characterized by fluctuations, and these fluctuations are known as business cycles. Business cycles typically comprise the following:

- **Expansionary Phase:** An expansionary phase is characterized by rising economic activity (real GDP) and growth. During an expansionary phase, economic activity is rising above its long-term growth trend. Firms' profits are likely to be rising during an expansionary phase as the demand for goods and services increases. Firms also are likely to increase their workforces during an expansion, and the prices of goods and services are likely to be rising.
- **Peak:** A peak is a high point of economic activity. It marks the end of an expansionary phase and the beginning of a contractionary phase in economic activity. At the peak of a business cycle, firms' profits are likely to be at their highest levels. Firms also are likely to face capacity constraints and input shortages (raw material and labor), leading to higher costs and higher overall price levels.
- **Contractionary Phase:** A contractionary phase is characterized by falling economic activity and growth, and follows a peak. During a contractionary phase, firms' profits are likely to be falling from their highest levels.
- **Trough:** A trough is a low point of economic activity. At this point of the business cycle, firms' profits are likely to be at their lowest levels. Firms also are likely to experience significant excess production capacity, leading them to reduce their workforces and cut costs.
- **Recovery Phase:** A recovery phase follows a trough. During a recovery phase, economic activity begins to increase and return to its long-term growth trend. Further, firms' profits typically begin to stabilize as the demand for goods and services begins to rise.



2.5 Terminology Used in Describing Business Cycles

2.5.1 Recession

A recession occurs when the economy experiences negative real economic growth (declines in national output). Economists define a recession as two consecutive quarters of falling national output. During a recession, firms' profits tend to fall and many firms incur losses. Firms also are likely to have excess capacity. As a result, during a recession, resources (including labor) are likely to be underutilized and unemployment is likely to be high.

2.5.2 Depression

A depression is a very severe recession. It is characterized by a relatively long period of stagnation in business activity and high unemployment rates. As a result, firms experience significant excess capacity. Furthermore, due to the significant reduction in the demand for goods and services, it is likely that many firms will go out of business during a depression.

3 Economic Indicators

Although business cycles tend to be irregular and unpredictable, economists nevertheless attempt to predict business cycles and their severity and duration using economic indicators. Economic indicators (gathered by The Conference Board) are statistics that historically have been highly correlated with economic activity. They can be "leading indicators," "lagging indicators," or "coincident indicators."

3.1 Leading Indicators

Leading indicators tend to predict economic activity. They change before the economy starts to follow a certain trend. The government routinely revises the numbers as more data becomes available. Thus, leading indicators are subject to change.

Leading indicators include:

- Average new unemployment claims
- Building permits for residences
- Average length of the workweek
- Money supply (M2)
- Standard & Poor's 500 stock index
- Orders for goods
- Price changes of materials
- Index of consumer expectations
- Interest rate spread
- Index of supply deliveries

3.2 Lagging Indicators

Lagging indicators tend to follow economic activity; i.e., they change after a given economic trend has already started. They give signals after the fact. Economists measure lagging indicators to confirm or dispute previous forecasts and the effectiveness of policy directives.

Lagging indicators include:

- Prime rate charged by banks
- Average duration of unemployment
- Commercial and industrial loans outstanding
- Consumer price index for services
- Consumer debt-to-income ratio
- Changes in labor cost per unit of manufacturing output
- Inventories-to-sales ratio

3.3 Coincident Indicators

Coincident indicators change at approximately the same time as the whole economy, thereby providing information about the current state of the economy. A coincident indicator may be used to identify, after the fact, the timing of peaks and troughs in a business cycle.

Coincident indicators include:

- Industrial production
- Manufacturing and trade sales
- Industrial production (GDP)
- Personal income less transfer payments

5

4 Reasons for Fluctuations

Although there are a variety of theories regarding the cause of business cycles, economists generally agree that business cycles result from shifts in aggregate demand and/or aggregate supply. Aggregate demand and aggregate supply curves can be used to illustrate the relationship between a country's output (real GDP) and price level (the GDP deflator). They also are used to examine the causes of economic fluctuations.

4.1 Aggregate Demand (AD) Curve

The aggregate demand (AD) curve illustrates the maximum quantity of all goods and services that households, firms, and the government are willing and able to purchase at any given price level. The curve shows the relationship between total output (real GDP) of the economy and the price level. Note that this "aggregate" demand curve is the macroeconomic demand curve of the "total" demand in the economy as a whole. The x-axis is real GDP and the y-axis is the price level.

4.2 Aggregate Supply (AS) Curve

The aggregate supply (AS) curve illustrates the maximum quantity of all goods and services producers are willing and able to produce at any given price level. Note that this "aggregate" supply curve is the macroeconomic supply curve of the "total" supply in the economy as a whole.

4.2.1 Short-Run Aggregate Supply Curve

The short-run aggregate supply (SRAS) curve is upward sloping, illustrating that as the price level rises, firms are willing to produce more goods and services.

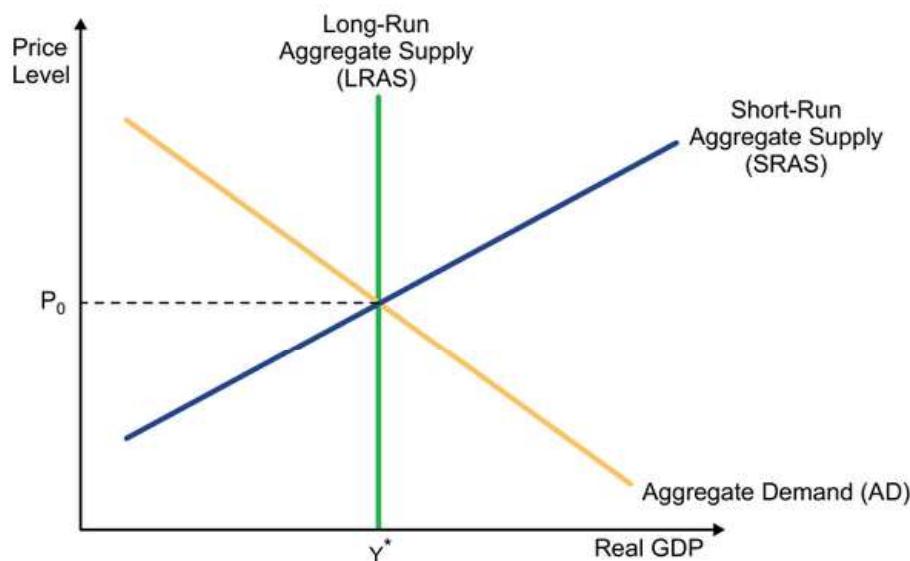
4.2.2 Long-Run Aggregate Supply Curve

The long-run aggregate supply (LRAS) curve is vertical, illustrating that in the long run, if all resources are fully utilized, output is determined solely by the factors of production. This curve corresponds to the potential level of output in the economy.

4.2.3 Potential Level of Output (Potential GDP)

Potential GDP refers to the level of real GDP (national output) that the economy would produce if its resources (capital and labor) were fully employed. When real GDP is below the potential level of output, the economy will typically be experiencing a recession. Similarly, when real GDP rises above the potential level of output, the economy typically will be experiencing an expansion.

Aggregate Demand and Aggregate Supply Curves



The intersection of the short-run aggregate supply (SRAS) curve and the aggregate demand (AD) curve determines the level of output (real GDP) and price level in the short run. The position of the long-run aggregate supply (LRAS) curve determines the level of output in the long run. The LRAS curve is vertical at the economy's potential level of output.

Y^* = GDP at the potential (equilibrium) level of output

4.3 Aggregate Demand, Aggregate Supply, and Economic Fluctuations

Business cycles, or economic fluctuations, result from shifts in aggregate demand and short-run aggregate supply (note that shifts in the long-run aggregate supply curve are associated with long-run growth in the economy and do not affect business cycles).

4.3.1 Reduction in Demand

If circumstances cause individuals, businesses, or governments to reduce their demand for goods and services, economic activity (real GDP) will decline, leading to a contraction in economic activity and possibly a recession. As a result, a reduction in demand tends to cause firms' profits to decline. Firms also are likely to experience an increase in excess capacity, leading them to reduce their workforces.

4.3.2 Increase in Demand

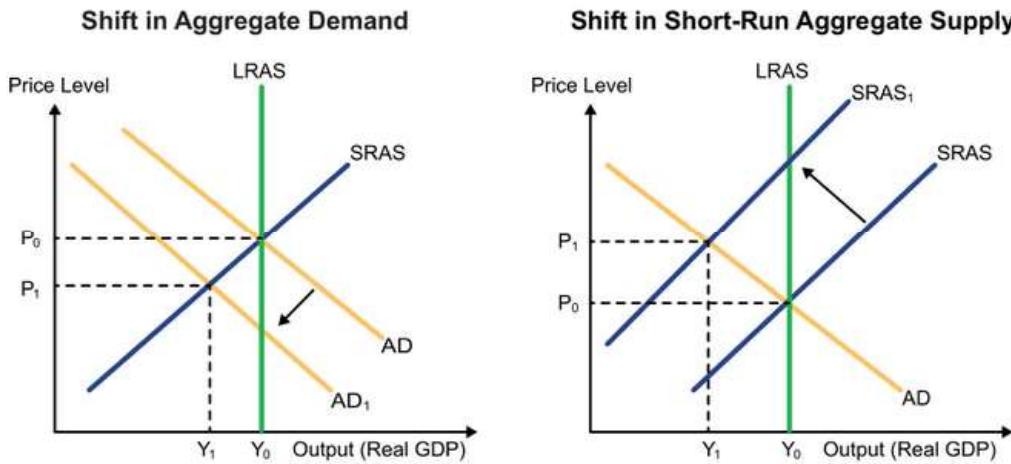
In contrast, if circumstances cause individuals, businesses, and governments to increase their demand for goods and services, economic activity will rise, leading to a recovery or an expansion in economic activity. As a result, an increase in demand tends to cause firms' profits to rise. Firms also are likely to experience a reduction in excess capacity, leading them to increase their workforces.

4.3.3 Reduction of Supply

If circumstances cause firms to reduce their supply of goods and services, economic activity will fall, leading to a contraction or possibly a recession. As firms reduce their supply, they also are likely to reduce their workforces, leading to higher unemployment.

4.3.4 Increase in Supply

If circumstances cause firms to increase their supply of goods and services, economic activity will rise, leading to an expansionary phase of economic activity. As firms increase their supply, they also are likely to increase their workforces, leading to lower unemployment.



A recession caused by a shift in the aggregate demand curve: A decrease in aggregate demand causes actual GDP to fall below potential GDP. This is illustrated as the leftward shift in aggregate demand. As a result, real GDP falls from Y₀ to Y₁.

A recession caused by a shift in the short-run aggregate supply curve: A decrease in short-run aggregate supply causes actual GDP to fall below potential GDP. This is illustrated as the leftward shift in the short-run aggregate supply curve. As a result, real GDP falls from Y₀ to Y₁.

4.4 Factors That Shift Aggregate Demand

The primary factors that shift aggregate demand are:

4.4.1 Changes in Wealth

- **Increase in Wealth:** An increase in real wealth causes the aggregate demand curve to shift to the right. Thus, an increase in wealth causes the economy to expand and leads to an increase in national output (real GDP).
- **Decrease in Wealth:** A decrease in wealth causes the aggregate demand curve to shift to the left. A decrease in wealth does the opposite of an increase in wealth. For example, a large decline in stock prices would decrease consumer wealth and therefore shift the aggregate demand curve to the left. As a result, national output would fall, causing a contraction and possibly a recession.

4.4.2 Changes in Real Interest Rates

- **Increase in Real Interest Rates:** An increase in interest rates increases the cost of capital and, therefore, tends to reduce consumer demand for durable goods, such as new cars and homes, and firms' demand for new plants and equipment. Therefore, an increase in real interest rates causes the cost of capital to rise and shifts the aggregate demand curve to the left, causing national output to fall.
- **Decrease in Real Interest Rates:** A decrease in real interest rates reduces the cost of borrowing, thereby increasing the demand for investment goods and shifting the aggregate demand curve to the right, causing national output to rise.

4.4.3 Changes in Expectations About the Future Economic Outlook (Consumer Confidence)

- **Confident Economic Outlook:** If households become confident about the economic outlook (consumer confidence increases), their willingness to acquire investments and consumer goods increases and the aggregate demand curve shifts right, causing national output to rise.
- **Uncertain Economic Outlook:** When the economic outlook appears more uncertain, consumers tend to reduce current spending, shifting aggregate demand to the left and causing national output to fall.

4.4.4 Changes in Exchange Rates

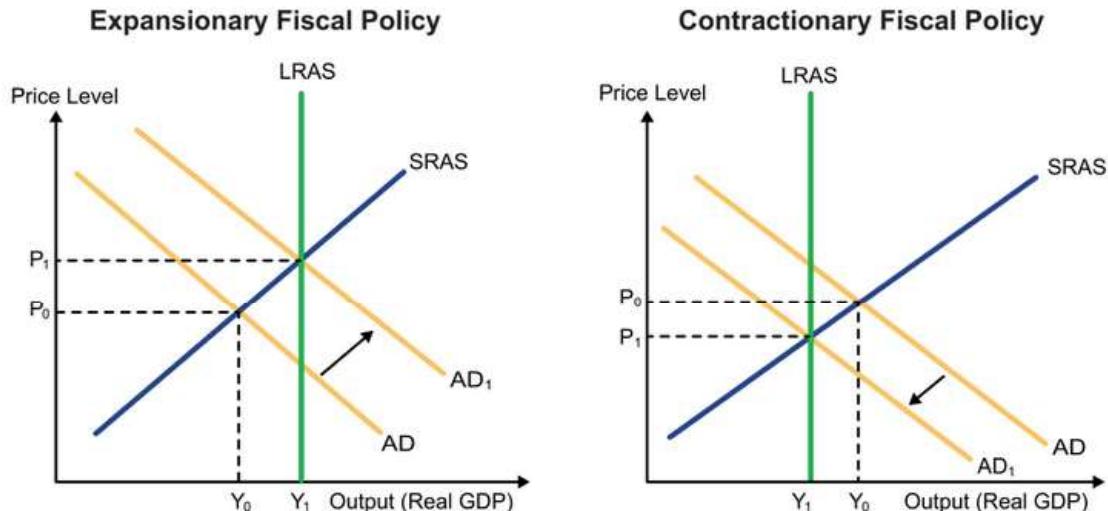
- **Appreciated Currencies:** If the currency of a country appreciates in real terms relative to the currencies of its trading partners, its goods will become relatively more expensive for foreigners, while foreign goods will become relatively less expensive for its residents. As a result, net exports (exports minus imports) will fall, shifting the aggregate demand curve to the left and causing national output to fall.
- **Depreciated Currencies:** If the currency of a country depreciates in real terms relative to the currencies of its trading partners, its goods will become relatively less expensive for foreigners, while foreign goods will become relatively more expensive for its residents. As a result, net exports (exports minus imports) will rise, shifting the aggregate demand curve to the right and causing national output to rise.

4.4.5 Changes in Government Spending

- **Increase in Government Spending:** An *increase* in government spending shifts the aggregate demand curve to the right, causing national output to rise.
- **Decrease in Government Spending:** A *decrease* in government spending shifts the aggregate demand curve to the left, causing national output to fall.

4.4.6 Changes in Consumer Taxes

- **Increase in Consumer Taxes:** An *increase* in consumer taxes (e.g., the personal income tax) reduces the disposable income (gross income minus taxes) of consumers and, therefore, shifts the aggregate demand curve to the left, causing national output to fall.
- **Decrease in Consumer Taxes:** A *decrease* in consumer taxes increases the disposable income of consumers and therefore shifts the aggregate demand curve to the right, causing national output to rise.



The economy is initially in a recession, illustrated as output level Y_0 , which is below the potential level of output Y_1 . The government can stimulate the economy by increasing government spending or decreasing taxes (or both), shifting the aggregate demand curve to the right and causing national output (real GDP) to rise.

The economy is initially in an expansionary phase, illustrated as output level Y_0 , which is above the potential level of output Y_1 . The government can contract the economy by decreasing government spending or increasing taxes (or both), shifting the aggregate demand curve to the left and causing national output (real GDP) to fall.



Pass Key

Remember the factors that shift aggregate demand as **TWICE** Government:

- Taxes**
- Wealth**
- Interest rates**
- Consumer** confidence
- Exchange** rates
- Government** spending

4.5 Multiplier Effect

The *multiplier effect* refers to the fact that an increase in consumer, company, or government spending produces a multiplied increase in the level of economic activity. For example, a \$1 increase in government spending results in a greater than \$1 increase in real GDP. The multiplier effect stems from the fact that increases in spending generate income for firms, which in turn spend that income. Their spending gives other households and firms income, and so on. Therefore, the effect of a \$1 increase in spending is magnified by the multiplier effect. The multiplier effect results from the marginal propensity to consume (MPC). The MPC is the change in consumption due to a \$1 increase in income. Because people tend to save part of their income, the MPC is typically less than one.

Using the MPC, the size of the multiplier effect can be calculated using the following formulas:

$$\text{Multiplier} = \frac{1}{(1 - \text{MPC})}$$

$$\text{Change in real GDP} = \text{Multiplier} \times \text{Change in spending}$$

Note: The examiners could refer to "1 – MPC" as the marginal propensity to save (MPS), so be aware of this terminology as well.

Example 2

Multiplier Effect

Facts: Suppose that the MPC is 0.8 (i.e., the change in consumption due to a \$1 increase in income is 80 cents) and that spending increases by \$100.

Required: Calculate the change in real GDP.

Solution:

$$\text{Change in real GDP} = \frac{1}{(1 - 0.8)} \times \$100 = \$500$$

Thus, a \$100 increase in spending results in a \$500 increase in real GDP.

4.6 Factors That Shift Short-Run Aggregate Supply

Recall that shifts in long-run aggregate supply are associated with economic growth, not business cycles. Therefore, when discussing business cycles, we focus on shifts in the short-run aggregate supply curve.

The primary factors that shift short-run aggregate supply are:

4.6.1 Changes in Input (Resource) Prices

- **Increase in Input Prices:** An *increase* in input prices (raw material prices, wages, etc.) causes the short-run aggregate supply curve to shift left. Thus, an increase in input prices causes the economy to contract and leads to a decrease in national output (real GDP).

Illustration 1 Increase in Input Prices

A large increase in oil prices (oil is a primary input in production) would shift the short-run aggregate supply curve to the left. As a result, national output would fall, causing a contraction and possibly a recession.

- **Decrease in Input Prices:** A *decrease* in input prices causes the short-run aggregate supply curve to shift to the right. A decrease in input prices causes the economy to expand and leads to an increase in national output (real GDP).

4.6.2 Supply Shocks

- **Supplies Are Plentiful:** If resource supplies become more plentiful, the short-run aggregate supply curve will shift to the right, causing national output to increase.
- **Supplies Are Curtailed:** If resource supplies are curtailed (e.g., crop failures, damage to infrastructure caused by earthquakes, etc.), the short-run supply curve will shift to the left, causing national output (real GDP) to decline.

Question 1

CPA-03291

Which of the following is *not* likely to cause a rightward shift in the aggregate demand curve?

- a. An increase in wealth.
- b. An increase in the level of real interest rates.
- c. An increase in government spending.
- d. An increase in the general level of confidence about the economic outlook.

[Answer](#) [Explanation](#)

Question 2

CPA-05318

Which of the following statements is correct if there is an increase in the resources available within an economy?

- a. More goods and services will be produced in the economy.
- b. The economy will be capable of producing more goods and services.
- c. The standard of living in the economy will rise.
- d. The technological efficiency of the economy will improve.

[Answer](#) [Explanation](#)



RT

1 Overview

Click to view

Economists and policy makers rely on a host of economic measures or indicators to determine the overall state of economic activity. Some of the most commonly cited economic measures are:

- Real gross domestic product (real GDP)
- Unemployment rate
- Inflation rate
- Interest rates

It is important to remember that these economic measures tend to move together. For example, when real GDP is rising, unemployment tends to be falling. Similarly, when the unemployment rate is rising, the inflation rate tends to be falling.

2 National Income Accounting System

The National Income and Product Accounting (NIPA) system was developed by the U.S. Department of Commerce to monitor the health and performance of the U.S. economy. The two methods for measuring GDP, expenditure approach and income approach, are calculated using NIPA. The combined economic output of the following four sectors is called gross domestic product (GDP), the total dollar value of all new final goods and services produced within the economy in a given period.

- Households (or consumers)
- Businesses
- Federal, state, and local governments
- Foreign sector

2.1 Two Methods of Measuring GDP

The two methods of measuring GDP are the *expenditure approach* and the *income approach*.

2.1.1 Expenditure Approach

Under the expenditure approach, GDP is the sum of the following four components:

- **Government** purchases of goods and services
- Gross private domestic **investment** (nonresidential fixed investment, residential fixed investment, and change in business inventories)
- Personal **consumption** expenditures (durable goods, nondurable goods, and services)
- Net **exports** (exports minus imports)

The first letters of the words in bold form the mnemonic **GICE**.

2.1.2 Income Approach

The income approach accounts for GDP as the value of resource costs and incomes generated during the measurement period. The income approach includes business profits, rent, wages, interest, depreciation, and business taxes. Under the income approach, GDP is the sum of the following eight components:

- **Income** of proprietors
 - **Profits** of corporations
 - **Interest** (net)
 - **Rental** income
 - **Adjustments** for net foreign income and miscellaneous items
 - **Taxes** (indirect business taxes)
 - **Employee** compensation (wages)
 - **Depreciation** (also known as capital consumption allowance)

The first letters of the words in bold form the mnemonic **I PIRATED**.

2.2 Comparison of Approaches

The two different approaches are used to prepare an "income statement" for the domestic economy (the GDP), as shown in the following table.

- The aggregate expenditures approach on the left is a flow of product approach (at market prices).
 - The income approach on the right is a flow of earnings and other resources that generate domestic income.

Comparison of Approaches (in Billions of Dollars)			
Expenditure Approach (Flow-of-Product)		Income Approach (Earnings and Costs)	
Government purchases	\$1,314.70	Income of proprietors	\$ 450.90
Investment	1,014.40	Profits of corporations	526.50
Consumption	4,698.70	Interest (net)	392.80
Exports (net)	(96.40)	Rental income	116.60
		Adjustments for net foreign income/ miscellaneous	45.00
		Taxes (indirect business)	572.50
		Employee compensation	4,008.30
		Depreciation (consumption of fixed capital)	818.80
Aggregate expenditure	<u><u>\$6,931.40</u></u>	Domestic Income	<u><u>\$6,931.40</u></u>

2.3 Other Measures of National Income

Although GDP is the most common measure of national income and an economy's output and performance, there are several other noteworthy measures.

- **Net Domestic Product (NDP):** *Net domestic product* is GDP minus depreciation (the capital consumption allowance).
- **Gross National Product (GNP):** *Gross national product* is defined as the market value of final goods and services produced by residents of a country in a given time period. GNP differs from GDP because GNP includes goods and services that are produced overseas by U.S. firms and excludes goods and services that are produced domestically by foreign firms.
- **Net National Product (NNP):** *Net national product* is defined as GNP minus economic depreciation (i.e., losses in the value of capital goods due to age and wear).
- **National Income (NI):** *National income* is NNP less indirect business taxes (e.g., sales tax).
- **Personal Income (PI):** *Personal income* is the income received by households and noncorporate businesses.
- **Disposable Income (DI):** *Disposable income* is personal income less personal taxes. It is the amount of income households have available either to spend or to save.

Illustration 1 GNP vs. GDP

If BMW produces cars in the United States, that production is counted as part of U.S. GDP, but it is not counted as part of U.S. GNP because BMW is a foreign-owned company.

3 Unemployment Rate

The *unemployment rate* measures the ratio of the number of people classified as unemployed to the total labor force. The total labor force includes all non-institutionalized individuals 16 years of age or older who either are working or are actively looking for work. (An unemployed person is defined as a person 16 years of age or older who is available for work and who has actively sought employment during the previous four weeks.) Note that to be counted as unemployed, a person must be actively looking for work. The unemployment rate can be expressed as:

$$\text{Unemployment rate} = \frac{\text{Number of unemployed}}{\text{Total labor force}} \times 100$$

3.1 Types of Unemployment

3.1.1 Frictional Unemployment

Frictional unemployment is normal unemployment resulting from workers routinely changing jobs or from workers being temporarily laid off. It is the unemployment that arises because of the time needed to match qualified job seekers with available jobs.

3.1.2 Structural Unemployment

Structural unemployment occurs when:

- jobs available in the market do not correspond to the skills of the workforce; and
- unemployed workers do not live where the jobs are located.

3.1.3 Seasonal Unemployment

Seasonal unemployment is the result of seasonal changes in the demand and supply of labor. For example, shortly before Christmas, the demand for labor in some industries increases and then decreases again after Christmas.

3.1.4 Cyclical Unemployment

Cyclical unemployment is the amount of unemployment resulting from declines in real GDP during periods of contraction or recession or in any period when the economy fails to operate at its potential. When real GDP is below the potential level of output, cyclical unemployment is positive. When real GDP is above the potential level of output, cyclical unemployment is negative. Thus, cyclical unemployment rises during a recession and falls during an expansion.

3.2 Natural Rate of Unemployment and Full Employment

3.2.1 Natural Rate of Unemployment

The *natural rate of unemployment* is the "normal" rate of unemployment around which the unemployment rate fluctuates due to cyclical unemployment. Thus, the natural rate of unemployment is the sum of frictional, structural, and seasonal unemployment or the employment rate that exists when the economy is at its potential output level.

3.2.2 Full Employment

Full employment is defined as the level of unemployment when there is no cyclical unemployment. Full employment does not mean zero unemployment. When the economy is operating at full employment, there is still frictional, structural, and seasonal unemployment.

4 Price Level and Inflation

4.1 Definitions

4.1.1 Inflation

Inflation is defined as a sustained increase in the general prices of goods and services. It occurs when prices on average are increasing over time.

4.1.2 Deflation

Deflation is defined as a sustained decrease in the general prices of goods and services. It occurs when prices on average are falling over time.

Most economists believe that deflation is a much bigger economic problem than inflation. During periods of deflation, firms are likely to experience significant excess production capacity. This occurs because consumers tend to hold off purchasing goods and services during a period of deflation because they realize that the price of goods and services is likely to continue to fall. Consequently, firm profits are likely to be falling during periods of deflation.

4.1.3 Inflation/Deflation Rate

The *inflation or deflation rate* is typically measured as the percentage change in the consumer price index (CPI) from one period to the next.

- **Consumer Price Index (CPI):** The *consumer price index* (CPI) is a measure of the overall cost of a fixed basket of goods and services purchased by an average household. The CPI is computed as follows:

$$\text{CPI} = \frac{\text{Current cost of market basket}}{\text{Base year cost of market basket}} \times 100$$

Example 1

Consumer Price Index

Facts: A doctoral student in economics is working on her dissertation. As part of her research, she selects four goods (products) that are consumed by college students on the local campus and then collects data to determine the average price changes for these products over the past 10 years. She gathers the following data for the four products.

	Time = 0 (Base year)	Time = Year 10 (Current year)
Product A	\$ 3.00	\$ 4.80
Product B	25.00	39.00
Product C	17.00	22.00
Product D	<u>6.00</u>	<u>8.20</u>
Total	\$51.00	\$74.00

Note: The prices for each product above are the average prices for T = 0 and T = 10.

Required: Compute the (consumer) price index for these four products.

Solution:

$$\begin{aligned}\text{CPI} &= \frac{\$74.00 \times 100}{\$51.00} \\ &= 145.1\end{aligned}$$

- **Inflation Rate:** Using the CPI, the inflation rate is calculated as the percentage change in the CPI from one period to the next:

$$\text{Inflation rate} = \frac{\text{CPI}_{\text{this period}} - \text{CPI}_{\text{last period}}}{\text{CPI}_{\text{last period}}} \times 100$$

- **Producer Price Index (PPI):** The *producer price index* (PPI) measures the overall cost of a basket of goods and services typically purchased by firms.

4.2 Causes of Inflation and Deflation

Inflation and deflation are caused by shifts in the aggregate demand and short-run aggregate supply curves.

A rightward shift in the *aggregate demand* curve will cause the price level to rise, leading to inflation. Similarly, a leftward shift in the *short-run aggregate supply* curve will also cause the price level to rise, leading to inflation.

4.2.1 Demand-Pull Inflation

Demand-pull inflation is caused by increases in aggregate demand. Thus, demand-pull inflation could be caused by factors such as:

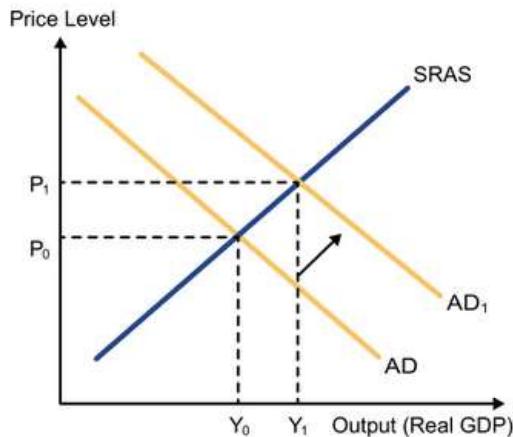
- increases in government spending;
- decreases in taxes;
- increases in wealth; or
- increases in the money supply.

4.2.2 Cost-Push Inflation

Cost-push inflation is caused by reductions in short-run aggregate supply. Thus, cost-push inflation could be caused by factors such as:

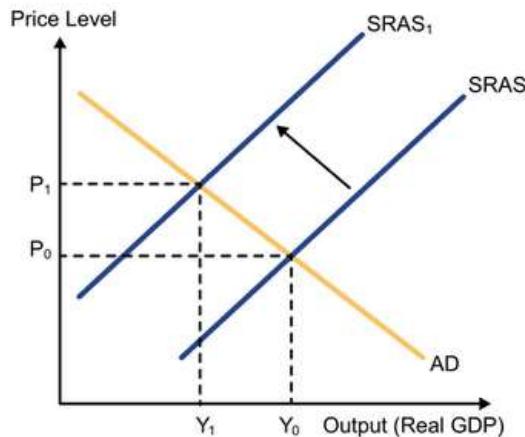
- an increase in oil prices; or
- an increase in nominal wages.

Demand-Pull Inflation



An increase in aggregate demand causes the short-run equilibrium price level to rise from P_0 to P_1 .

Cost-Push Inflation



A decrease in short-run aggregate supply causes the short-run equilibrium price level to rise from P_0 to P_1 .

4.2.3 Deflation

Deflation is also caused by shifts in aggregate demand or short-run aggregate supply. A shift left in aggregate demand (perhaps brought about by a stock market crash or a large increase in taxes) will cause the aggregate price level to fall. Similarly, a shift right in the short-run aggregate supply curve will also cause the aggregate price level to fall.

4.3 Inflation and the Value of Money

Inflation has an inverse relationship with purchasing power. As the price level rises, the value of money (purchasing power) declines.

4.3.1 Definitions

- **Monetary Assets and Liabilities:** *Monetary assets and liabilities* (e.g., cash, accounts receivable, notes payable, etc.) are fixed in dollar amounts regardless of changes in specific prices or the general price level.
- **Nonmonetary Assets and Liabilities:** The value of nonmonetary assets (e.g., a building, land, machinery, etc.) and nonmonetary liabilities (e.g., rent collected in advance) will fluctuate with inflation and deflation.

4.3.2 Holding Monetary Assets

During a period of inflation, those with a fixed amount of money or income (e.g., retired persons) will be hurt (i.e., their purchasing power will be eroded). Similarly, firms that loan money at fixed interest rates are likely to be hurt by inflation.

4.3.3 Holding Monetary Liabilities

During a period of inflation, those with a fixed amount of debt (e.g., those with home mortgages) will be aided (i.e., the debt will be repaid with inflated dollars). Thus, inflation also tends to benefit firms with large amounts of outstanding debt.

Illustration 2 OPEC and the Stagflation of the 1970s

From 1973 to 1974, OPEC (Organization of the Petroleum Exporting Countries) substantially curtailed its production of crude oil. As a result, the price of a barrel of crude oil rose from about \$2 a barrel in late 1973 to \$10 a barrel in late 1974.

This increase in the price of crude oil had a substantial effect on the U.S. economy. Specifically, rising crude oil prices represented an increase in input costs for U.S. firms. As a result, firms cut back production and the short-run aggregate supply curve shifted left.

As the short-run aggregate supply curve shifted left, national output (real GDP) began to decline, unemployment began to rise, and the aggregate price level began to rise (cost-push inflation).

The combination of falling national output and a rising price level is known as *stagflation*. The actions of OPEC in 1973–74 led to a recession in the U.S. that was particularly harsh because not only was the unemployment rate rising, but the newly unemployed were facing higher prices for goods and services due to inflation.

Illustration 3 The Great Depression and Deflation

The Great Depression began with the stock market crash of Oct. 29, 1929. By 1932, the Dow Jones Industrial Average had fallen 89 percent from its peak in 1929. In addition, shortly before the stock market crash, the Federal Reserve (the central bank of the U.S.) increased interest rates in an attempt to control inflation. It then increased interest rates again in early 1931.

Although the stock market crash was not the only cause of the Great Depression, it did mark the beginning of the Great Depression. The Great Depression was caused by a number of factors, including ill-timed interest rate hikes by the Federal Reserve and protectionist trade policies, as well as the stock market crash. The table below shows what happened to real GDP, the unemployment rate, and the price level (as measured by the CPI) from 1929 through 1933.

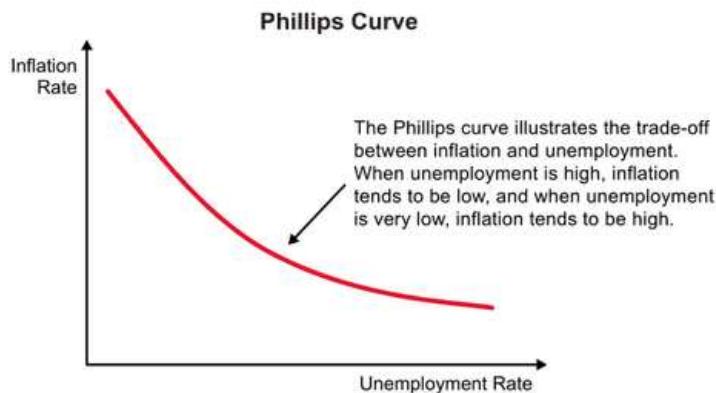
Year	Real GDP (Billions of 1987 Dollars)	Unemployment Rate	Price Level (CPI)
1929	821.8	3.15%	17.1
1930	748.9	8.71%	16.7
1931	691.3	15.91%	15.2
1932	599.7	23.65%	13.7
1933	587.1	24.87%	13.0

As the table illustrates, the Great Depression was characterized by falling output (falling real GDP), rising unemployment, and deflation. The deflation that occurred can be seen by noting that from 1929 through 1933, the price level fell continuously. Furthermore, at the height of the Great Depression, one out of every four workers was unemployed.

The data suggest that the Great Depression was caused by a shift left in aggregate demand. Specifically, the stock market crash reduced household wealth, which shifted the aggregate demand curve to the left. In addition, the interest rate hikes orchestrated by the Federal Reserve increased the cost of capital, thereby decreasing the demand for investment goods and shifting the aggregate demand curve even further to the left. As aggregate demand fell, the price level also fell and the nation experienced a period of deflation.

4.4 Inverse Relationship Between Inflation and Unemployment

The *Phillips curve* illustrates the inverse relationship between the rate of inflation and the unemployment rate. It illustrates the trade-off that exists in the short run between inflation and unemployment. Unemployment and inflation have historically moved in opposite directions, but during the oil shocks of the 1970s, the Phillips curve broke down. The oil crisis (a supply shock) caused a decrease in short-run aggregate supply that caused both unemployment and inflation.



5 Budget Deficits and Surpluses

The budget is the federal government's plan for spending funds and raising revenues through taxation, fees, and other means (and for borrowing funds if necessary). The budget deficit and the budget surplus are important indicators of the current and future health of an economy.

5.1 Budget Deficits

A budget deficit occurs when a country spends more than it takes in (mostly in the form of taxes during the year).

5.1.1 Financing Budget Deficits

Budget deficits are usually financed by government borrowing, which affects interest rates. The government could also finance budget deficits by printing new money. Financing budget deficits by printing money, however, causes inflation.

5.1.2 Cyclical Budget Deficit

A *cyclical budget deficit* is caused by temporarily low economic activity. For example, a cyclical budget deficit might be caused by a recession and the resulting lower level of national output.

5.1.3 Structural Budget Deficit

A *structural budget deficit* is one that is caused by a structural imbalance between government spending and revenue. Structural deficits are not caused by temporarily low economic activity.

5.2 Budget Surpluses

A *budget surplus* occurs when government revenues exceed government spending during the year.

6 Interest Rates and the Money Supply

9

6.1 Nominal and Real Interest Rates

6.1.1 Nominal Interest Rate

The *nominal interest rate* is the amount of interest paid (or earned) measured in current dollars. When the economy experiences inflation, nominal interest rates are not a good measure of how much borrowers really pay or lenders really receive when they take out or make a loan. A more accurate measure of the interest borrowers pay or lenders receive is the *real interest rate*.

6.1.2 Real Interest Rate

The *real interest rate* is defined as the nominal interest rate minus the inflation rate. It is a measure of the purchasing power of interest earned or paid.

$$\text{Real interest rate} = \text{Nominal interest rate} - \text{Inflation rate}$$

Illustration 4 Real Interest Rate

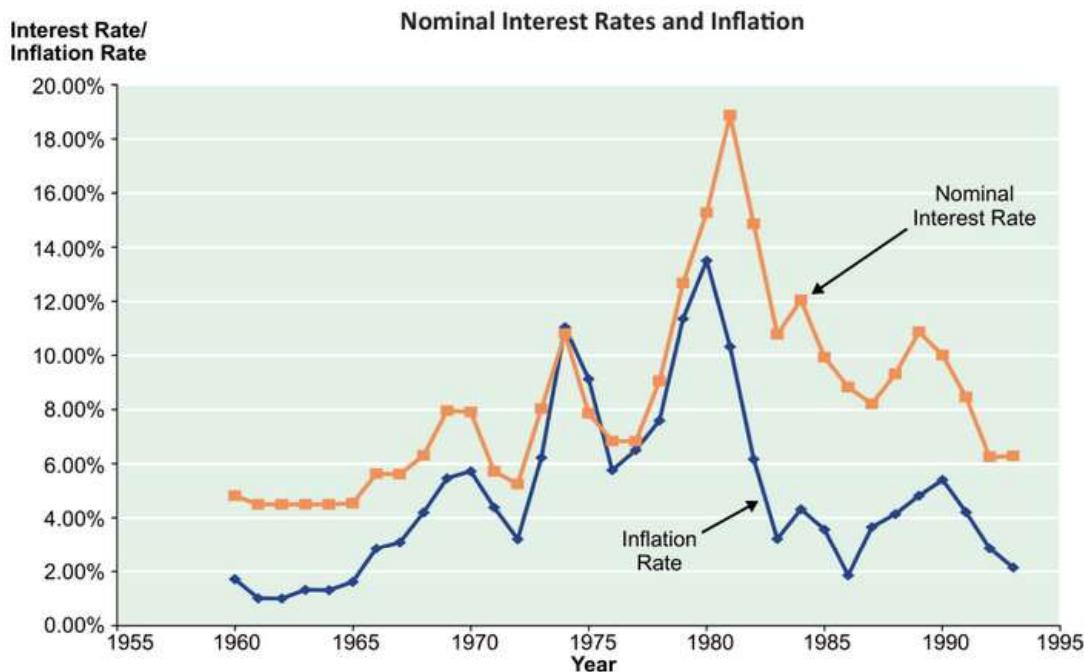
If you take out a loan with a 10 percent nominal interest rate and the inflation rate is 3 percent, then your real interest rate is only 7 percent. That is, after adjusting for the fact that the dollars with which you will repay the loan in the future are worth less than current dollars due to inflation, you are really only paying 7 percent to borrow the money.

6.1.3 Relationship Between Nominal Interest Rates and Inflation

Nominal interest rates and inflation naturally move together. When the inflation rate increases, so does the nominal interest rate. The relationship between nominal interest rates and inflation may be shown by rearranging the above equation for real interest rates as follows:

$$\text{Nominal interest rate} = \text{Real interest rate} + \text{Inflation rate}$$

Thus, if *real interest rates* do not change, a one percent increase in the inflation rate will lead to a one percent increase in *nominal interest rates*.



Note the close relationship between nominal interest rates and the inflation rate. As the inflation rate increases, the nominal interest rate also increases. Also note that about 1974–1975, the inflation rate was actually higher than the nominal interest rate, implying real interest rates were negative.

6.2 Definition of Money and the Money Supply

Money is the set of liquid assets generally accepted in exchange for goods and services. The money supply is defined as the stock of all liquid assets available for transactions in the economy at any given point in time. There are several definitions of money supply. M1 and M2 are the most common measures of money supply and are reported (periodically) in financial publications (for example, The Wall Street Journal).

6.2.1 M1

M1 is defined broadly as money that is used for purchases of goods and services. It typically includes coins, currency, checkable deposits (accounts that allow holders to write checks against interest-bearing funds within them), and traveler's checks. M1 does not include savings accounts or certificates of deposit (CDs).

6.2.2 M2

M2 is defined broadly as M1 plus liquid assets that cannot be used as a medium of exchange but that can be converted easily into checkable deposits or other components of M1. These include time certificates of deposit less than \$100,000, money market deposit accounts at banks, mutual fund accounts, and savings accounts.

6.2.3 M3

M3 includes all items in M2 as well as time certificates of deposit of \$100,000 or more.

Example 2

The Money Supply

Facts: Assume that at year-end, an economy had the following liquid assets (in billions of dollars):

Money market deposit accounts	\$10,500
Checkable deposits	42,100
Certificates of deposits > \$100,000	3,435
Traveler's checks	700
Mutual funds	24,650
Currency	85,284
Savings accounts	37,169

Required: Calculate the economy's M1, M2, and M3 money measures.

Solution:

$$\text{M1} = \text{Checkable deposits} + \text{Traveler's checks} + \text{Currency}$$

$$\$42,100 + \$700 + \$85,284 = \mathbf{\$128,084 \text{ billion}}$$

$$\text{M2} = \text{M1} + \text{Money market deposits} + \text{Mutual funds} + \text{Savings accounts}$$

$$\$128,084 + \$10,500 + \$24,650 + \$37,169 = \mathbf{\$200,403 \text{ billion}}$$

$$\text{M3} = \text{M2} + \text{Certificates of deposits} > \$100,000$$

$$\$200,403 + \$3,435 = \mathbf{\$203,838 \text{ billion}}$$

6.3 Interest Rates and the Demand for and Supply of Money

6.3.1 Demand for Money Is Inversely Related to Interest Rates

Changes in the money supply have a direct effect on interest rates because interest rates are determined by the supply of and demand for money. The demand for money is the relationship between how much money individuals want to hold and the interest rate. The demand for money is inversely related to the interest rate—as interest rates rise, it becomes more expensive to hold money (because holding money rather than saving or investing it means you do not earn interest), thus reducing the demand for money.

6.3.2 Supply of Money Is Fixed at a Given Point in Time

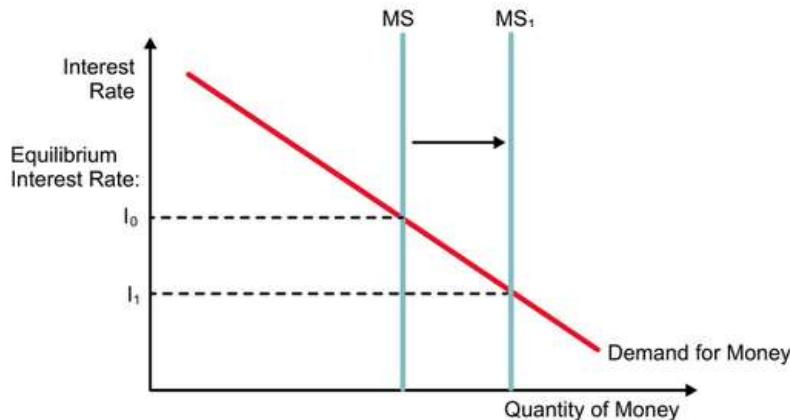
As noted above, the supply of money is determined by the Federal Reserve and is therefore fixed at any given point in time at the level set by the Federal Reserve.

6.3.3 The Money Market

The graph below illustrates the demand for and supply of money. The intersection of the money demand curve and the money supply line determines the interest rate.

- An increase in the money supply will cause interest rates to fall.
- Conversely, a decrease in the money supply will cause interest rates to rise.

The Money Market



The equilibrium interest rate is found where the demand for money intersects the supply of money. The money supply curve is vertical since the Federal Reserve controls the supply of money (thus it is independent of the interest rate). If the Fed increases the money supply, interest rates will fall, as illustrated by the fall in interest rates from I_0 to I_1 .

7 The Federal Reserve and Monetary Policy

Monetary policy is the use of the money supply to stabilize the economy. The Federal Reserve uses monetary policy to increase or decrease the money supply in an effort to promote price stability and full employment. Understanding the effects of changes in the money supply is important because changes in the money supply lead to changes in interest rates, changes in the price level, and changes in national output (real GDP).

7.1 Tools of the Federal Reserve

The Federal Reserve controls the money supply through the following mechanisms.

7.1.1 Open Market Operations (OMO)

Open market operations consist of the purchase and sale of government securities (Treasury bills and bonds) in the open market by the Federal Reserve as a means to expand or contract the existing money supply. Open market operations are the most common method used by the Federal Reserve to impact monetary policy.

- When the Federal Reserve purchases government securities, it increases the money supply (that is, puts money into circulation to pay for the securities). Specifically, the money supply is increased when the Federal Open Market Committee (FOMC) of the Federal Reserve decides to purchase government securities.
- When the Federal Reserve sells government securities, it decreases the money supply (that is, takes money out of circulation).

7.1.2 Changes in the Discount Rate

The *discount rate* is the interest rate the Federal Reserve charges member banks for short-term (normally overnight) loans. Member banks may borrow money from the Federal Reserve to cover liquidity needs, increase reserves, or make investments.

- Raising the discount rate discourages borrowing by member banks and decreases the money supply.
- Lowering the discount rate encourages borrowing by member banks and increases the money supply.

7.1.3 Changes in the Required Reserve Ratio (RRR)

The *required reserve ratio* is the fraction of total deposits banks must hold in reserve.

- Raising the reserve requirement decreases the money supply.
- Lowering the reserve requirement increases the money supply.

7.2 Expansionary Monetary Policy (Increase in the Money Supply)

Expansionary monetary policy results when the Fed increases the money supply, affecting the economy through the following chain of events:

1. An increase in the money supply causes interest rates to fall.
2. Falling interest rates reduce the cost of capital and hence stimulate the desired levels of firm investment and household consumption.
3. Increases in desired investment and consumption cause an increase in aggregate demand.
4. Aggregate demand shifts to the right, causing real GDP to rise, the unemployment rate to fall, and the price level to rise.

7.3 Contractionary Monetary Policy (Decrease in the Money Supply)

Contractionary monetary policy results when the Fed decreases the money supply. The effect is the exact opposite of expansionary monetary policy. Specifically:

1. A decrease in the money supply causes interest rates to rise.
2. Rising interest rates reduce the desired levels of firm investment and household consumption.
3. Decreases in desired investment and consumption cause a decrease in aggregate demand.
4. Aggregate demand shifts to the left, causing real GDP to fall, the unemployment rate to rise, and the price level to fall.

Question 1**CPA-03396**

Assume the following data for the U.S. economy in a recent year:

Personal consumption expenditures	\$5,015 billion
Exports	106 billion
Government purchases of goods/services	1,040 billion
M1	262 billion
Imports	183 billion
Gross private domestic investment	975 billion
Open market purchases by Federal Reserve	5 billion

Based on this information, which of the following was the U.S. GDP for the year in question?

- a. \$6,953 billion
- b. \$6,958 billion
- c. \$6,691 billion
- d. \$7,215 billion

Answer Explanation**Question 2****CPA-03404**

What type of unemployment is shown when individuals do not have the qualifications or skills necessary to fill available jobs?

- a. Frictional
- b. Natural
- c. Cyclical
- d. Structural

Answer Explanation

Question 3**CPA-05857**

Which of the following individuals would be most hurt by an unanticipated increase in inflation?

- a. A retiree living on a fixed income.
- b. A borrower whose debt has a fixed interest rate.
- c. A union worker whose contract includes a provision for regular cost-of-living adjustments.
- d. A saver whose savings was placed in a variable rate savings account.

Answer Explanation**Question 4****CPA-05869**

Assume an economy is at the peak of the business cycle. Which of the following policy combinations is the most effective way to dampen the economy and prevent inflation?

- a. Increase government spending, reduce taxes, increase money supply, and reduce interest rates.
- b. Reduce government spending, increase taxes, increase money supply, and increase interest rates.
- c. Reduce government spending, increase taxes, reduce money supply, and increase interest rates.
- d. Reduce government spending, reduce taxes, reduce money supply, and reduce interest rates.

Answer Explanation



RT

1 The Laws of Demand and Supply

Click to view

While macroeconomics focuses on how human behavior affects outcomes in highly aggregated markets (e.g., products, labor), microeconomics focuses on how human behavior affects the conduct of more narrowly defined units, including a single individual, household, or business firm. Basic principles of microeconomic theory are very important on the CPA Exam, but understanding the fundamentals is also important to the business manager. Managers are more likely to be successful if they understand how their actions and various governmental policies or collusive actions (for example, cartels) affect their market and firm. A market is simply a collection of buyers and sellers *meeting or communicating* in order to trade goods or services.

1.1 Demand

1.1.1 Definitions

■ Demand Curve

The *demand curve* illustrates the maximum quantity of a good that consumers are willing and able to purchase at each and every price (at any given price), all else being equal. Note that this demand curve is similar to the aggregate demand curve, except that the x-axis here is quantity and not real GDP. It does, however, illustrate the same kind of relationship. This demand curve is the microeconomics demand curve for a certain good or product and not the total demand in the economy as a whole.

■ Quantity Demanded

Quantity demanded is defined as the quantity of a good (or service) individuals are willing and able to purchase at each and every (given) price, all else being equal.

■ Change in Quantity Demanded (Movement Along the Demand Curve)

A *change in quantity demanded* is a change in the amount of a good demanded resulting solely from a change in price. Changes in quantity demanded are shown by *movements along the demand curve* (D). When assumptions regarding price or quantity change, the "demand point" will change along this demand curve. For example, if the price of a product increases, there will be a move up the demand curve.

■ Change in Demand (Movement of the Demand Curve)

A *change in demand* is a change in the amount of a good demanded resulting from a change in something other than the price of the good. A change in demand cannot be due to a change in price. A change in demand causes a shift in the demand curve.

1.1.2 Fundamental Law of Demand

The *fundamental law of demand* states that the price of a product (or service) and the quantity demanded of that product (or service) are inversely related. As the price of the product increases (decreases), the quantity demanded decreases (increases). Quantity demanded is inversely related to price for two reasons:

■ Substitution Effect

The *substitution effect* refers to the fact consumers tend to purchase more (less) of a good when its price falls (rises) in relation to the price of other goods. The substitution effect exists because people tend to substitute one similar good for another when the price of a good they usually purchase increases. For example, if the price of Pepsi decreases, it will be used as a substitute for Coca-Cola (a similar good).

■ Income Effect

The *income effect* means that as prices are lowered with income remaining constant (i.e., as purchasing power or real income increases), people will purchase more of all of the lower-priced products. For example, a decrease in the price of a good increases a consumer's real income even when nominal income remains constant. As a result, the consumer can purchase more of all goods.

1.1.3 Factors That Shift Demand Curves (Factors Other Than Price)

○ ■ Changes in Wealth

A positive or negative change in wealth for people will result in a shift in the demand curve. For example, if people become wealthier it may increase (shift) their demand for luxury items (e.g., high-end sports cars).

○ ■ Changes in the Price of Related Goods (Substitutes and Complements)

If the price of a similar good (a substitute good) increases, the demand curve will shift to the right (increase) for the original good, now perceived as a bargain. If the price of a good used in conjunction with the original good (referred to as a complementary good) decreases, the demand for the original good will increase (e.g., if personal computer prices fall, demand increases for peripherals, such as monitors and printers).

○ ■ Changes in Consumer Income

An increase in consumers' incomes will shift the demand curve to the right (depicted as the shift from D_1 to D_2). Assume, for example, that employment in a local community is primarily retail-based. Because employees' commissions rise during the Christmas season, those employees will have additional consumer income and will demand more goods (demand curve shifts to right).

○ ■ Changes in Consumer Tastes or Preferences for a Product

When consumers' preferences (tastes) for a given product increase or decrease, there is a shift in the demand curve. For example, if the clothing industry experiences a revival of the 1960s era, the demand for bell-bottom jeans (retro clothing) will increase. This is also depicted as the shift from D_1 to D_2 .

○ ■ Changes in Consumer Expectations

If consumers anticipate that there will be a future price increase, immediate demand will increase for that product (at the current, lower price). For example, if commuters expect that the price of a monthly or annual bus pass will increase 10 percent in the near term, there should be a spike in demand for bus passes.

○ ■ Changes in the Number of Buyers Served by the Market

An increase in the number of buyers will shift the demand curve to the right. This is evident in a community in which there has been a steady rise in the population of people 65 and older. As the number of senior citizens grows, there will be more buyers of prescription drugs, resulting in a shift in the demand curve to the right.