Managerial Accounting:

An Introduction To Concepts, Methods, And Uses

Financial Modeling for Short-Term Decision Making

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Learning Objectives (Slide 1 of 2)

- Describe the use of financial modeling for profit-planning purposes.
- Explain how to perform cost-volume-profit (CVP) analysis.
- Describe the use of spreadsheets in financial modeling.
- Identify the effects of cost structure and operating leverage on the sensitivity of profit to changes in volume.

Learning Objectives (Slide 2 of 2)

- Explain how to use sales dollars as the measure of volume.
- Explain the effect of taxes on financial modeling.
- Describe the use of financial modeling in a multiple product setting.
- Explain financial modeling with multiple cost drivers.

Financial Modeling

- Can provide an overview of a firm's financial activities or help managers make specific decisions
  - Relies on the concepts of fixed and variable cost behavior
- Financial models allow firms to test the interaction of economic variables in a variety of settings
  - Must develop a set of equations representing a firm's operating and financial relations

Cost-Volume-Profit Model

- Cost-volume-profit (CVP) model summarizes the effects of volume changes on a firm's costs, revenues, and income
  - Analysis can be extended to determine the impact on profit of changes in selling prices, service fees, costs, income tax rates, and the mix of products and services

Break-Even Point

- Break-even point is the volume of activity that produces equal revenues and costs for the firm
  - No profit or loss at this point
- Two approaches to determining break-even point
  - Contribution-margin approach
  - Equation approach

Contribution-Margin Approach

- Contribution margin per unit is the selling price per unit less variable costs per unit
- Break-even volume =

$$\frac{\text{Fixed Costs}}{\text{Contribution Margin per Unit}}$$

Equation Approach (Slide 1 of 2)

- An alternative approach to calculate the break-even point uses the following equation:

Sales Revenue - Variable Costs - Fixed Costs = Operating Profit

- Break-even point occurs where operating profit equals zero

Equation Approach (Slide 2 of 2)

- Previous equation can be expanded algebraically to the following:

(Sales Price/Unit * Sales Volume) - (Variable Cost/Unit * Sales Volume) - Fixed Costs = Operating Profit

Which equals:

[(Sales Price/Unit - Variable Cost/Unit) * Sales Volume] - Fixed Costs = Operating Profit

Break-Even Point Example
(Slide 1 of 3)

- Early Horizons Daycare developed the following cost and price estimates:
  - Price per Child per Month $600
  - Variable Cost per Child per Month 200
  - Fixed Costs per Month 5,000
- Horizons has a capacity of 20 children per month
- The building has a capacity of 30 children

Break-Even Point Example
(Slide 2 of 3)

- Contribution Margin Approach
  - Price per Child $600
  - Variable Cost per Child -200
  - Contribution Margin per Child $400
- Break-Even Volume = $5,000 / $400 = 12.5 Children per Month

Break-Even Point Example
(Slide 3 of 3)

- Equation approach

[(Sales Price/Unit - Variable Cost/Unit) * Sales Volume] - Fixed Costs = Operating Profit

[($600-$200) * Sales Volume] - $5,000 = $0

[($400) * Sales Volume] = $5,000

Sales Volume = $\frac{\$5,000}{\$400}$ = 12.5 Children per Month

Target Profit

- CVP analysis can be used to determine the sales volume required to achieve a specified target profit
  - Note that the previous break-even analysis was used to determine the unit sales required to achieve a target profit of $0

Target Profit - Example
(Slide 1 of 3)

- Recall from the previous example:
- Early Horizons Daycare (con't)
  - Price per Child per Month $600
  - Variable Cost per Child per Month 200
  - Fixed Costs per Month 5,000
- Early Horizons Daycare would like to achieve a target operating profit of $3,000 per month

Target Profit - Example
(Slide 2 of 3)

- Contribution Margin Approach
  - Price per Child $600
  - Variable Cost per Child -200
  - Contribution per Child $400

Target Profit Volume = $\frac{\$5{,}000 + \$3{,}000}{\$400}$ = 20 Children per Month

Target Profit - Example
(Slide 3 of 3)

- Equation approach

[(Sales Price/Unit - Variable Cost/Unit) * Sales Volume] - Fixed Costs = Operating Profit

[($600-$200) * Sales Volume] - $5,000 = $3,000

[($400) * Sales Volume] = $8,000

Sales Volume = $\frac{\$8,000}{\$400}$ = 20 Children per Month

Step Costs

- Step costs can be factored into CVP analysis
  - Requires break-even point calculation for each level of capacity

Margin of Safety

- *Margin of safety* - excess of projected sales units over break-even sales level, calculated as follows:

Sales Units - Break-Even Sales Units = Margin of Safety

- Provides an estimate of the amount that sales can drop before the firm incurs a loss
  - Can also be computed using sales dollars

Cost Structure and Operating Leverage (Slide 1 of 2)

- Cost structure refers to the proportion of fixed and variable costs to total costs
  - Has a significant effect on sensitivity of firm's profits to changes in sales volume
- Operating leverage refers to the extent to which a firm's cost structure is made up of fixed costs

Cost Structure and Operating Leverage (Slide 2 of 2)

- The higher the firm's operating leverage, the higher the break-even point
  - For firms with high operating leverage, once break-even point is reached, further increases in sales increase profits significantly

Sales Dollars as a Measure of Volume (Slide 1 of 2)

- Break-even point and Target Profit can be calculated in sales dollars in addition to sales units (previously discussed)
- Formulas remain essentially the same, except now we use the contribution ratio instead of contribution margin
  - Contribution Ratio = $\frac{\text{Contribution Margin}}{\text{Sales Price}}$

Sales Dollars as a Measure of Volume (Slide 2 of 2)

- Break-even in Sales Dollars =

$$\frac{\text{Fixed Costs}}{\text{Contribution Margin Ratio}}$$

- Target Profit in Sales Dollars =

$$\frac{\text{Fixed Costs + Target Profit}}{\text{Contribution Margin Ratio}}$$

Income Taxes

- Income taxes can be factored into CVP analysis
  - If t = firm's tax rate, the before-tax profit necessary to yield the desired after-tax profit can be calculated as follows:

$$\text{Before-Tax Profit} = \frac{\text{After-Tax Profit}}{(1-t)}$$

Multiple Product Financial Modeling (Slide 1 of 5)

- When a firm has multiple products, several alternatives are available to facilitate financial modeling
  - Assume all products have the same contribution margin
  - Assume a weighted-average contribution margin
  - Treat each product line as a separate entity
  - Use sales dollars as a measure of volume

Multiple Product Financial Modeling (Slide 2 of 5)

- Assume all products have the same contribution margin
  - Can group products so they have equal or near equal contribution margins
  - Can be a problem when products have substantially different contribution margins

Multiple Product Financial Modeling (Slide 3 of 5)

- Assume a weighted-average contribution margin
  - To determine break-even units, use the following formula:

$$\frac{\text{Fixed Costs}}{\text{Weighted Average Contribution Margin}}$$

Multiple Product Financial Modeling (Slide 4 of 5)

- Treat each product line as a separate entity
  - Requires allocating indirect costs to product lines
  - To extent allocations are arbitrary, may lead to inaccurate estimates

Multiple Product Financial Modeling (Slide 5 of 5)

- Use sales dollars as a measure of volume
  - Can use weighted average contribution margin break-even dollar sales calculated as follows:

$$\frac{\text{Total Contribution Margin}}{\text{Total Sales}}$$

CVP Model Assumptions

- Costs can be separated into fixed and variable components
- Cost and revenue behavior is linear throughout the relevant range
  - Total fixed costs, variable costs per unit, and sales price per unit remain constant throughout the relevant range
- Product mix remains constant

Financial Modeling and ABC (Slide 1 of 2)

- CVP analysis so far has been based on the use of one volume-based cost driver
- The CVP model can be expanded to incorporate multiple cost drivers under Activity-Based Costing
  - Can incorporate unit, batch, product, customer, and facility-level cost drivers

Financial Modeling and ABC (Slide 2 of 2)

- Under ABC, the following cost expression might be used:

  (Unit-Level Cost * Number of Units)
  + (Batch-Level Cost * Batch CDA)
  + (Product-Level Cost * Product CDA)
  + (Customer-Level Cost * Customer CDA)
  + (Facility-Level Cost * Facility CDA)
  =Total Cost

- CDA = Cost Driver Activity

If you have any comments or suggestions concerning this PowerPoint Presentation for Managerial Accounting, An Introduction To Concepts, Methods, And Uses, please contact:

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