

Cost-Volume-Profit Analysis

Cost-Volume-Profit (CVP) Analysis – Quick Reference Notes

1. What Is CVP Analysis?

- A managerial accounting tool that examines how **costs**, **sales volume**, and **profit** interrelate.
 - Helps answer “what-if” questions such as:
 - How many units must we sell to break even?
 - What profit results from a change in price or cost? **Key Insight:** Profit changes linearly with volume as long as the underlying cost behavior (fixed vs. variable) remains unchanged.
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2. Core Assumptions

Assumption	Meaning
Linear cost behavior	Total cost = Fixed Cost + (Variable Cost per unit × Quantity).
Constant selling price	Unit selling price does not vary with volume.
Single product (or constant product mix)	When multiple products are sold, the sales-price-weighted average contribution margin stays constant.
All costs are either fixed or variable	No mixed or step costs are considered in the basic model.
Production = sales	No inventory buildup or depletion during the period.
Short-run horizon	Fixed costs are truly fixed for the period under analysis.

3. Key Terminology

Term	Definition
Fixed Costs (FC)	Costs that do not change with output (e.g., rent, salaries).
Variable Costs (VC)	Costs that vary directly with output (e.g., direct materials).
Total Cost (TC)	FC + VC.
Selling Price per Unit (P)	Revenue earned for each unit sold.

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Term	Definition
Variable Cost per Unit (V)	VC divided by quantity.
Contribution Margin (CM)	Per unit: $(CM_u = P - V)$ Total: $(CM_T = (P - V) \times Q)$.
Contribution Margin Ratio (CMR)	$(CMR = \frac{CM_u}{P} = \frac{P - V}{P})$.
Break-Even Point (BEP)	Output level where profit = 0.
Target Profit Analysis	Determines required sales to achieve a specified profit.

4. Fundamental Formulas

4.1. Basic Profit Equation

$$[\text{Profit}] = [\text{Total Revenue}] - [\text{Total Cost}] \quad [\Pi = (P \times Q) - [FC + (V \times Q)]]$$

4.2. Contribution Margin Form

$$[\Pi = (P - V) \times Q - FC] \quad [\Pi = CM_u \times Q - FC]$$

4.3. Break-Even Quantity (Units)

$$[Q_{BE} = \frac{FC}{P - V} = \frac{FC}{CM_u}]$$

4.4. Break-Even Sales Dollars

$$[\text{Sales}_{BE} = \frac{FC}{CMR}]$$

4.5. Target Profit Quantity

$$[Q_{TP} = \frac{FC + \text{Target Profit}}{CM_u}]$$

4.6. Target Profit Sales Dollars

$$[\text{Sales}_{TP} = \frac{FC + \text{Target Profit}}{CMR}]$$

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5. Graphical Representation

1. **X?axis:** Units sold (Q).
2. **Y?axis:** Dollars (cost