

Accounting Notes

Contribution Margin, Break-even Analysis, Product Costing Methods

Definitions:

Variable Costs (VC) - costs that change, in total, in direct proportion to changes in volume of activity

Fixed Costs (FC) - costs that do not change, in total, despite changes in production level

Mixed Costs (MC) - costs that have a variable part and a fixed part

Contribution Margin (CM) - excess of sales revenue over variable expenses

Contribution Margin Income Statement Format:

Sales Revenue	\$1,000,000	\$725,000
Variable Expenses:		
Variable Manufacturing COGS	\$100,000	
Variable Marketing Expenses	75,000	
Variable Distribution Expenses	<u>40,000</u>	<u>215,000</u>
Contribution Margin	\$785,000	\$510,000
Fixed Expenses:		
Fixed Manufacturing Expenses	\$200,000	
Fixed Marketing Expenses	45,000	
Fixed Distribution Expenses	<u>65,000</u>	<u>310,000</u>
Operating Income	<u>\$475,000</u>	<u>\$ 200,000</u>

Break-Even Analysis:

Break-Even Point - sales level at which operating income is zero. (Total Revenue = Total Expenses)

Formulas

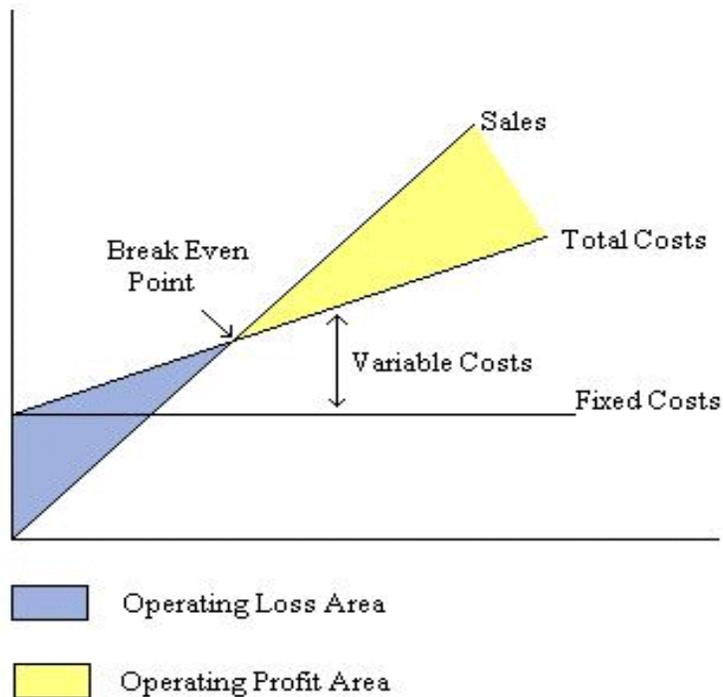
$$\text{Contribution Margin} = \text{Sales} - \text{Variable Costs}$$

$$\text{Contribution Margin Ratio} = \frac{\text{Contribution Margin}}{\text{Sales}}$$

$$\text{Break-Even Point (In Units)} = \frac{\text{Fixed Costs} + \text{Operating Income}}{\text{CM per unit}}$$

$$\text{Break-Even Point (In Dollars)} = \frac{\text{Fixed Costs} + \text{Operating Income}}{\text{CM ratio}}$$

CVP Graph



Margin of Safety - is the excess of the expected Sales over the Break Even Sales

Formulas:

Margin of Safety = Expected Sales - Break Even Sales
(Can be expressed in units or dollars)

Margin of Safety = $\frac{\text{Margin of Safety}}{\text{Expected Sales}}$
(As a %)

Sales Mix

Sales mix is used for finding break even sales when more than one product is produced or sold. The process of finding the break even point involves three steps.

Step 1 - Find the weighted average Contribution Margin per unit

	Product A	Product B	Total
Sales price per unit	\$10.00	\$15.00	
Deduct: Variable expense per unit	<u>3.00</u>	<u>10.00</u>	
Contribution Margin per unit	\$ 7.00	\$ 5.00	
Sales mix in units	<u>5</u>	<u>3</u>	8
Contribution Margin	<u>\$35.00</u>	<u>\$15.00</u>	<u>\$50.00</u>
Weighted Average CM per unit			<u>\$ 6.25</u>

Step 2 - Find the Break Even Sales in total units

$$\text{Sales in total units} = \frac{\text{Fixed Costs} + \text{Operating Income}}{\text{Weighted Average CM per unit}} = \frac{7000 + 5500}{6.25} = 2000$$

Step 3 - Find the Break Even Sales for each product

	Total Units		Sales Mix (as a fraction)	=	Break Even Units
Product A	2000	X	5/8	=	1250
Product B	2000	X	3/8	=	<u>750</u>
Total					<u>2000</u>

Sales mix fraction = Units of each Product / Total Units

Product Costing Methods

There are two methods of determining a products cost - the Absorption Costing method and the Variable Costing method. As you can see below the only difference between the two methods is in how the Fixed Manufacturing Overhead (MOH) is treated. Under the Variable Costing method it is treated as a period cost and therefore not included in the cost of the product.

Absorption Costing	Variable Costing
Direct Materials	Direct Materials
Direct Labor	Direct Labor
Variable MOH	Variable MOH
Fixed MOH	
= Total Product Cost	= Total Product Cost