

# CVP in practice: Case study - budget airlines



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# Business Finance: Determining Sales Volume Cost Volume Profit Analysis

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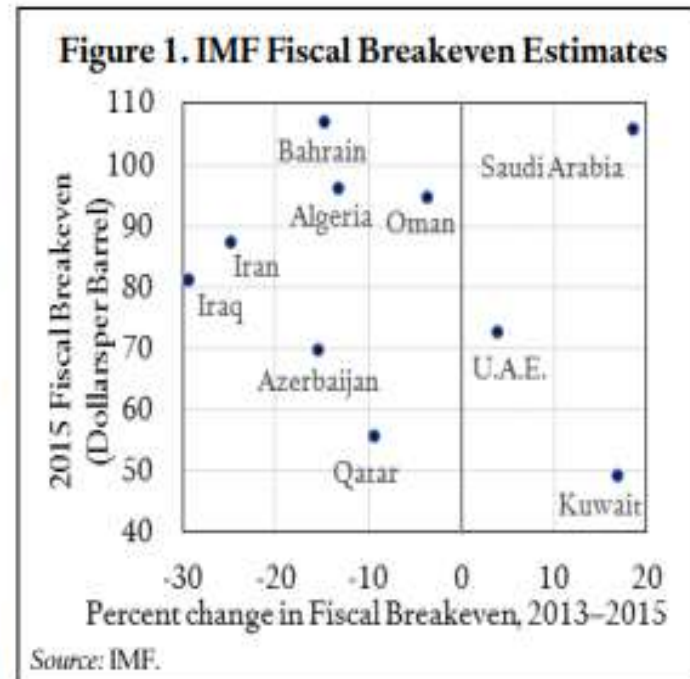


# CVP in practice: case study Oil in Covid-19



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An oil-exporting country's "fiscal breakeven" oil price is the minimum price per barrel that the country needs in order to meet its expected spending needs while balancing its budget (figure 1). Oil prices below this level should result in budget deficits unless government policies change. Breakeven prices have become popular among analysts and decision-makers in public and private sectors as indicators of oil-producing countries' economic and political stability and as ingredients in oil price forecasts. In recent years, for example, analysis based on fiscal breakeven prices was used to forecast instability in Russia and Iran, and—driven by an assumption that Saudi Arabia would cut its production in order to prevent prices from falling below its fiscal breakeven—to predict that oil prices would never fall far below one hundred dollars a barrel.



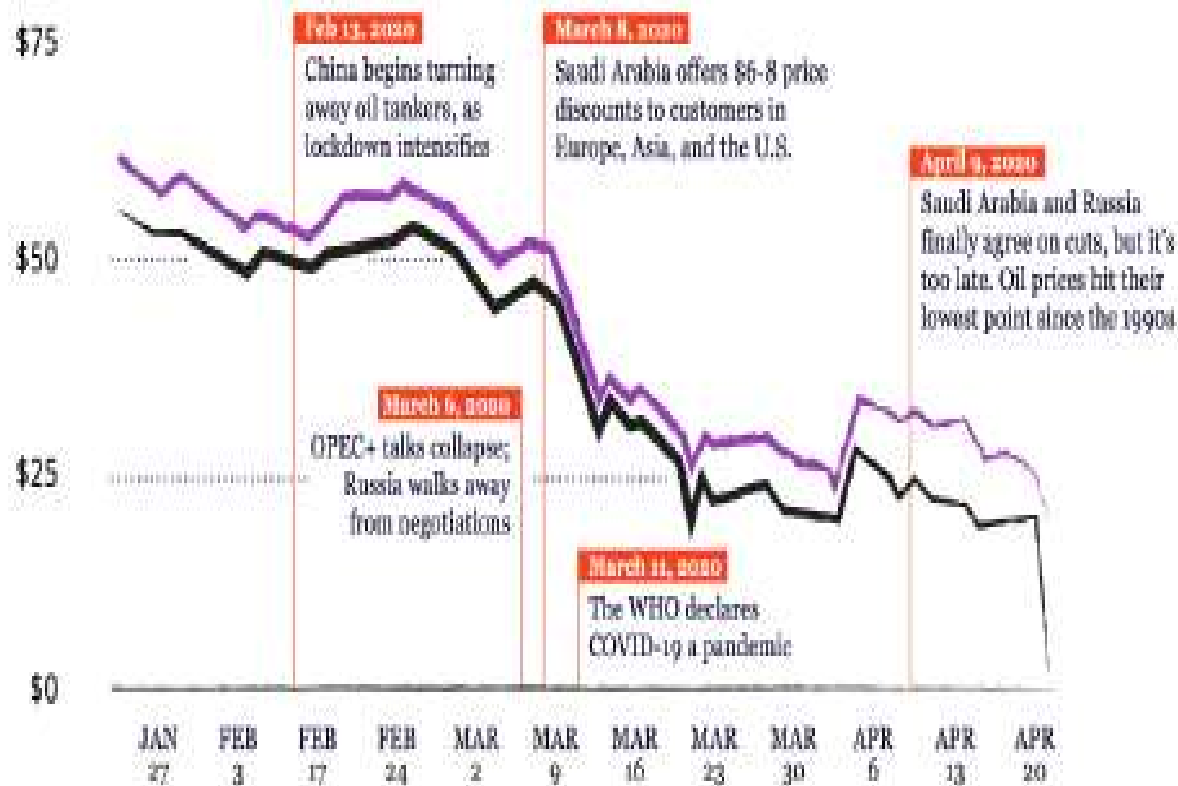
Source: Council on Foreign Relations



# CVP in practice: case study Oil in Covid-19



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Source: Visual Capitalist





# CVP in practice: case study Oil in Covid-19



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# Cost-Volume-Profit Analysis



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**LO 3-1** Use cost-volume-profit (CVP) analysis to analyze decisions.

## What is CVP?

CVP analysis explores the relationship between revenue, cost, and volume and their effect on profits.



LO 3-  
1

# CVP Example



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		Office World			
		Income Statement			
		for the month of March			
					Rands
Sales (2000 chairs at R750 each)					1,500,000
Less variable costs					900,000
	Variable manufacturing costs (2000 x R372)			744,000	
	Variable selling costs (2000 x R78)			<u>156,000</u>	
Contribution margin					600,000
Less fixed costs					405,000
	Operating profit				195,000

Unit Contribution margin =  $R600,000 \div 2,000 = R300$

Unit Contribution margin ratio =  $R300 \div R750 = 40\%$

Or  
 $600K/1500K = 40\%$



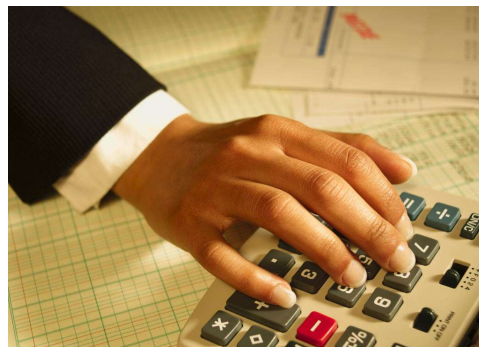
# CVP: Break-Even calculated in 2 ways



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$$\text{Break-even volume (units)} = \frac{\text{Fixed costs}}{\text{Unit contribution margin}}$$

$$\text{Break-even volume (sales Rands)} = \frac{\text{Fixed costs}}{\text{Unit contribution margin ratio}}$$





# Break-Even Volume in Units



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This is the volume level at which profits equal zero.

$$\begin{aligned}\text{Break-even volume (in units)} &= \frac{\text{Fixed costs}}{\text{Unit contribution margin}} \\ &= R405,000 \div R300 \\ &= 1350 \text{ chairs}\end{aligned}$$

# Break-Even Volume in Sales Amount



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Break-even volume (in sales amount)

$$\begin{aligned} &= \frac{\text{Fixed costs}}{\text{Unit contribution margin ratio}} \\ &= R405,000 \div 0.40 \\ &= R1,012,500 \end{aligned}$$

(translates into 1,350 chairs @ R750 per chair)



# CVP Application: Target Volume



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$$\text{Target volume (units)} = \frac{\text{Fixed costs} + \text{Target profit}}{\text{Unit contribution margin}}$$

$$\text{Target volume (sales amount)} = \frac{\text{Fixed costs} + \text{Target profit}}{\text{Contribution margin ratio}}$$

# CVP : Target Volume (units)



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$$\text{Target volume (units)} = \frac{\text{Fixed costs} + \text{Target profit}}{\text{Unit contribution margin}}$$

$$= \frac{\text{R405,000} + \text{R495,000}}{\text{R300}}$$

$$\text{Target volume (units)} = 3,000 \text{ chairs}$$

## CVP : Target Volume (sales amount)



$$\text{Target volume (sales amount)} = \frac{\text{Fixed costs} + \text{Target profit}}{\text{Unit contribution margin ratio}}$$

$$= \frac{\text{R}405,000 + \text{R}495,000}{0.40}$$

$$\text{Target volume (sales amount)} = \text{R}2,250,000$$

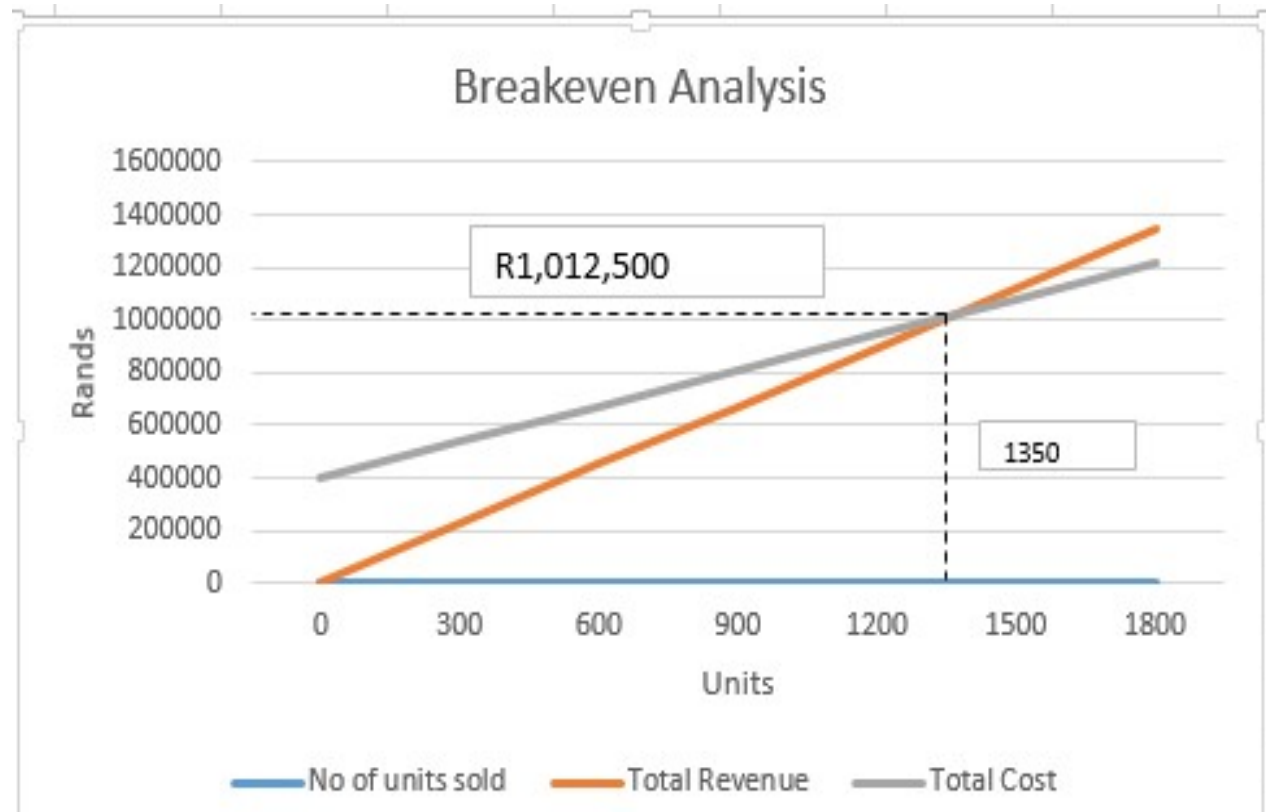
(translates into 3,000 chairs @ R750 per chair)



# Graphic Presentation



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# CVP Analysis with Spreadsheets



**LO 3-3** Use Microsoft Excel to perform CVP analysis.

**DEMO**

A spreadsheet program is ideally suited to performing CPV routinely.

1. Choose “Tools: Goal Seek...” from the menu bar.
2. In the “Set cell” edit field, enter the cell address for the target profit calculation.
3. In the “To value” edit field, enter the target profit.
4. In the “By changing cell” edit field, enter the cell address of the volume variable.
5. Click “OK” and the program will find the break-even volume.

1	Office World		
2			
3	Price	750	
4	Variable Cost	450	
5	Fixed Cost	405,000	
6			
7	Profit	495,000	
8	Volume	3,000	
9			

# Use of CVP to Analyze the Effect of Different Cost Structures



**LO 3-2** Understand the effect of cost structure on decisions.

## Cost Structure

The proportion of fixed and variable costs to total costs.

## Operating Leverage

The extent to which the cost structure is comprised of fixed costs.

# Use of CVP to Analyze the Effect of Different Cost Structures



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$$\text{Operating leverage} = \frac{\text{Contribution margin}}{\text{Operating profit}}$$

The higher the organization's operating leverage, the higher the break-even point.



# Comparison of Cost Structures



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	Lo-Lev Company (1,000,000 units)		Hi-Lev Company (1,000,000 units)	
	Rands	%	Rands	%
Sales	R1,000,000	100	R1,000,000	100
Variable costs	750,000	75	250,000	25
Contribution margin	250,000	25	750,000	75
Fixed costs	50,000	5	550,000	55
Operating profit	200,000	20	200,000	20
Break-even point	? units		? units	
Contribution margin per unit	?		?	





# Comparison of Cost Structures



Suppose Low-Lev and High-Lev both increase sales 10% or R100,000.

	Lo-Lev	Hi-Lev
Sales increase	R100,000	R100,000
Contribution margin	0.25	0.75
Increase in profit	R25,000	R75,000
Prior net income	R200,000	R200,000
Net income with sales increase of 10%	R225,000	R275,000

## Practical application: Airline Industry



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- Legacy carrier

VS

## Low cost carrier



# Margin of Safety



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The excess of projected or actual sales volume  
over break-even volume

**or**

The excess of projected or actual sales revenue  
over break-even revenue

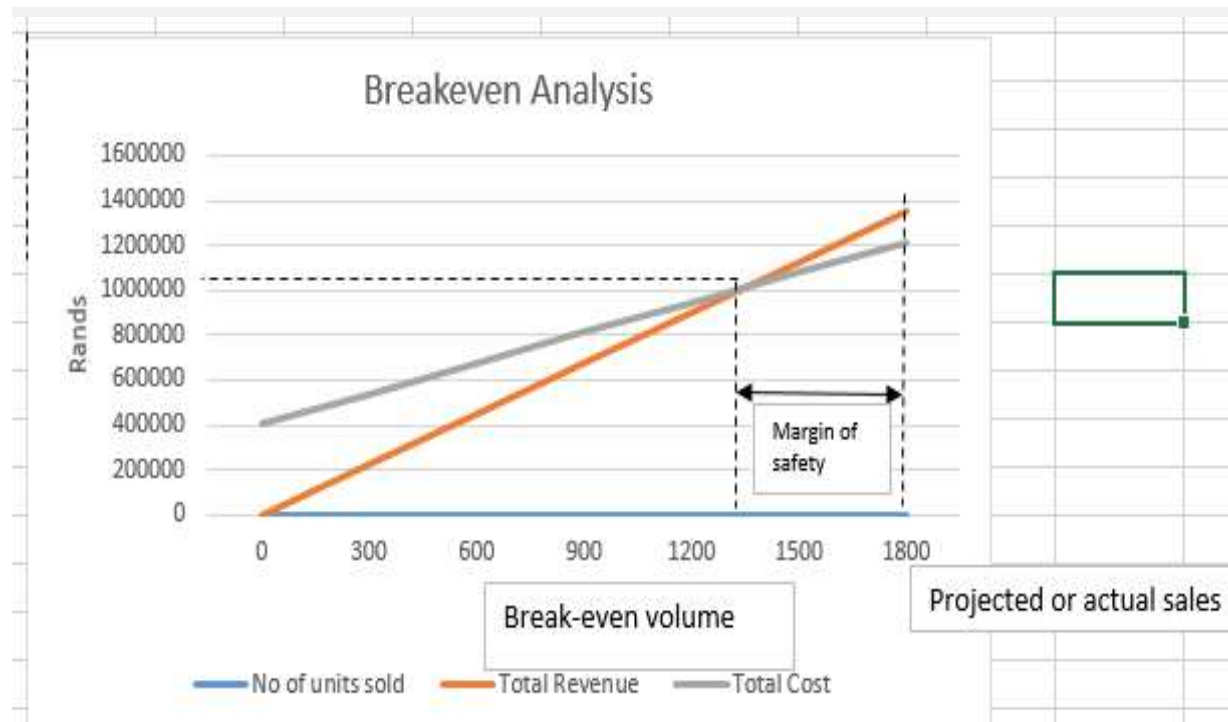
Suppose Office World sells 1,800 chairs.

At a break-even volume of 1,350, its margin of  
safety is:

Sales – Break-even

$$1,800 - 1,350 = 450 \text{ chairs}$$





## Extensions of the CVP Model: Multiproduct Analysis



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Management expects to sell 5 chairs at R750 each for every 2 cabinets it sells at R2,000 each.

	Chairs	Cabinets
Selling price	R750	R2,000
Less: Variable cost	<u>450</u>	<u>950</u>
Contribution margin	R300	R1,050

Total fixed costs = R572,400





## Extensions of the CVP Model: Multiproduct Analysis



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**What is the contribution margin of the mix?**

$$(5 \times 300) + (2 \times 1,050) = R1,500 + R2,100 = R3,600$$

**What is the weighted-average unit contribution margin of the mix?**

$$(5/7 \times R300) + (2/7 \times R1,050) = R514.29$$



# Extensions of the CVP Model: Multiproduct Analysis



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**What is the break-even of the mix?**

$$\text{R}572,400 \text{ fixed costs} \div \text{R}514.29 = 1,113 \text{ units}$$

$$\begin{aligned} 1113 \times 5/7 &= 795 \text{ chairs} \\ 1113 \times 2/7 &= \underline{318} \text{ cabinets} \\ \text{Total units} &= 1,113 \end{aligned}$$

## Break-even Sales in Rands

$$\begin{aligned} 795 \text{ chairs} \times \text{R}750 &= \text{R}596,250 \\ 318 \text{ cabinets} \times \text{R}2,000 &= \underline{636,000} \\ \text{Total rands} &= \text{R}1,232,250 \end{aligned}$$



# Extensions of the CVP Model: Multiproduct Analysis



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## Weighted Average Revenue

$$(5/7 \times R750 \text{ for chairs}) + (2/7 \times R2,000 \text{ for cabinets}) = R1,107.14$$

**What is the weighted-average  
contribution margin percentage?**  
 $R514.29 \div R1,107.14 = 46.452\%$

Or  $3600/7750 = 46.452\%$



## Extensions of the CVP Model: Multiproduct Analysis



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### Weighted Average Revenue

$$(5/7 \times R750) + (2/7 \times R2,000) = R1,107.14$$

### Weighted Average Contribution Margin

$$R514.29 \div R1,107.14 = 46.452\%$$

Information from  
previous slide.

### Break-even Sales in Rands

$$R572,400 \div 0.46452 = R1,232,240^*$$

\*Difference of R10 due to rounding



# Practice Questions



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Question 1: Practice multiproduct CVP analysis using excel.

Question 2: Practice CVP





# Extensions of the CVP Model: Alternative Cost Structures

LO 3-  
4

Unit  
Contribution  
margin R300

Let's assume Fixed costs for Office World is R405,000 for up to 2,100 chairs, but increases by R295,000 for chair sales between 2,100 and 4,000. They have received orders for 2,200 chairs. Should they accept?

Break-even volume

$$= R405,000 \div R300$$

$$= 1,350 \text{ chairs}$$

But now

$$= R700,000 \div R300$$

$$= 2,334$$

Class  
Challenge



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