6.2 Cost-volume-profit analysis

Name: _____ Class: _____ Date: _____ **Total: 17 marks**

KEY WORDS contribution margin • break-even point • margin of safety

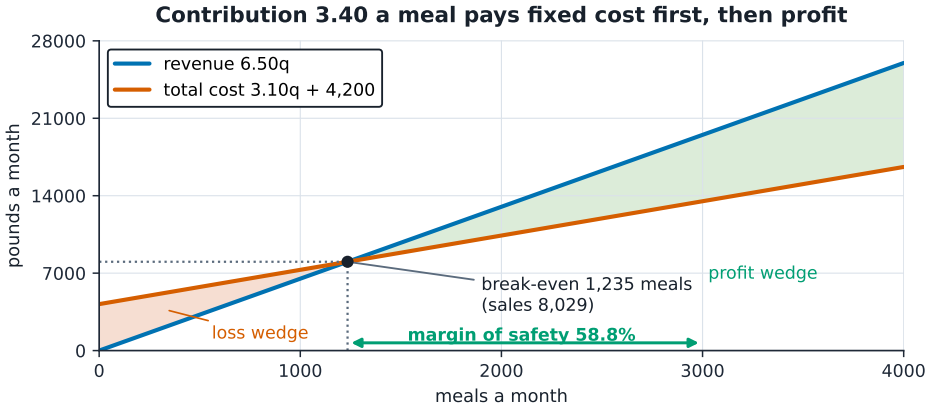
Objective

Compute break-even, target volumes (with tax), margin of safety and leverage; model multi-product CVP with mix.

1 Key knowledge and worked examples

The CVP kit

$q^* = F/CM$; targets: $(F + \text{profit})/CM$ (pre-tax the profit first); $MoS = (q - q^*)/q$; leverage $= CM_{total}/\text{profit}$. Mix: the bundle CM is the weighted CM – state it, watch it.



Loss wedge left, profit wedge right, safety in between

Worked example. Nimbus Kitchen

CM 3.40: break-even 1,235 ✓; target 5,000 → 2,706 ✓; 6,000 after 25% tax → 3,588 ✓; MoS at 3,000 = 58.8% ✓; 60:40 bundle CM 2.28 ✓.

2 Practice

A coffee cart: price £3.20, variable £1.40, fixed £2,250 a month.

2.1 Compute the CM per cup, the CM ratio, and break-even in cups and pounds. [4]

2.2 Target profit £1,800: how many cups? And if the target is £1,500 AFTER a 25% tax? [4]

2.3 At a 2,000-cup month, compute the margin of safety and the operating leverage. [3]

2.4 The cart adds muffins: CM £1.10, sold one per two cups. What is the cup+muffin bundle CM, and the bundle break-even against the £2,250 fixed? [3]

2.5 The price falls 5% with no cost change. In two lines: what happens to break-even, and why does a 5% price cut hurt more than a 5% variable-cost rise? [3]

Solutions

2.1

- $CM = 3.20 - 1.40 = £1.80$.
- Ratio $= 1.80/3.20 = 56.25\%$.
- Break-even $= 2{,}250/1.80 = 1{,}250$ cups.
- $= £4{,}000$ of sales.

2.2

- £1,800: $(2{,}250 + 1{,}800)/1.80 = 2{,}250$ cups.
- £1,500 after tax: pre-tax $1{,}500/0.75 = £2{,}000$.
- $q = (2{,}250 + 2{,}000)/1.80 = 2{,}361$ cups.

2.3

- $MoS = (2{,}000 - 1{,}250)/2{,}000 = 37.5\%$.
- Leverage $= (1.80 \times 2{,}000)/(1.80 \times 2{,}000 - 2{,}250) = 3{,}600/1{,}350 = 2.67$.

2.4

- Bundle (2 cups + 1 muffin): $2 \times 1.80 + 1.10 = £4.70$.
- Per "customer unit": £4.70.
- Bundle break-even $= 2{,}250/4.70 = 479$ customer units (958 cups + 479 muffins).

2.5

- New CM $= 3.04 - 1.40 = £1.64$; break-even $= 2{,}250/1.64 = 1{,}372$ cups, up 10%.
- The price cut hits the WHOLE margin; the cost rise hits only the variable share – margin changes are always bigger than their percentages suggest.

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