37 | Break-even analysis

Question 1

(a) The number of rugs Jun Shan must sell to break even is given by:

$$BE = \frac{\text{Fixed cost}}{\text{Contribution}}$$

$$= \frac{£2,000}{£105 - £65}$$

$$= \frac{£2,000}{£40}$$

$$= 50 \text{ rugs}$$

(b) If 500 rugs are sold in a year the profit made is given by:

Profit = Total revenue - Total cost
= £105 × 500 - (£2,000 + £65 × 500)
= £52,500 - (£2,000 + £32,500)
= £52,500 - £34,500
= £18,000

(c) If the price is raised to £115 break-even output is given by:

$$BE = \frac{£2,000}{£115 - £65}$$

$$= \frac{£2,000}{£50}$$

$$= 40 \text{ rugs}$$

Question 2

(a) (i) £0.
(ii) £24,000.
(b) £4,000.
(c) (i) 10 guitars.
    (ii) £12,000.
(d) (i) 2 guitars.
    (ii) 10 guitars.
(e) (i) £18,000.
    (ii) £16,000.
    (iii) £2,000.
    (iv) £12,000.
    (v) £800.

Case study

(a) The contribution made by each batch of pies is given by:

Contribution = Selling price - variable cost
= 50p × 100 - £20
= £50 - £20
= £30

(4 marks)

(b) The number of batches Carl would need to sell in the first year to break-even is given by:

Break-even = Fixed costs/contribution
= £3,000 ÷ £30
= 100 batches

Therefore Carl would need to sell 10,000 (100 × 100) pies in a single year to break even. This appears to be quite a lot, however, it is only two batches every week.

(6 marks)

(c) The amount of profit made by Carl if he sold 55,000 pies in his first year would be given by:

Profit = TR - TC
= 50p × 55,000 - (£3,000 + 55,000/100 × £20)
= £27,500 - (£3,000 + £11,000)
= £27,500 - £14,000
= £13,500

(6 marks)

(d) The number of batches that Carl would need to produce and sell to break even at the new price and higher lease charge is given by:

$$BE = \frac{£5,000}{70p \times 100 - £20}$$

$$BE = \frac{£5,000}{£70 - £20}$$

$$BE = \frac{£5,000}{£50}$$

$$BE = 100 \text{ batches}$$

Consequently the changes in fixed cost and price have no effect on the break-even level of output. It is still 100 batches.

(6 marks)

(e) Break-even analysis is used in business as a tool to make decisions. A week before Carl signed a 12 month lease for the kitchen unit, he put some figures together to help him assess the possible profitability of the venture. These figures could have been used to find out how many pies he needed to sell to cover all of his costs, i.e. to break even. He may have done this before committing himself to the lease. Carl can also use break-even analysis to help answer 'what if' questions. For instance, he needed to look at the financial position of the business when the landlord raised the rent and what the effect would be if he also raised the price of his pies. He found that the break-even position did not alter after the changes in rent and price. Break-even analysis is also found in business plans. Carl might have included some break-even analysis in his business plan.

However, unfortunately break-even analysis does have some limitations. It is often regarded as too simplistic and some of its assumptions are unrealistic. It assumes that all output is sold, so that output equals sales, and no stocks are held. Many businesses hold stocks of finished goods to cope with changes in demand. There are also times when firms cannot sell what they produce and choose to stockpile their output to avoid laying off staff. Carl is not likely to keep stocks because his products are perishable. However, there is a chance he may not sell all he produces.

The break-even chart is drawn for a given set of conditions. It cannot cope with a sudden increase in wages and prices or changes in technology. The effectiveness of break-even analysis depends on the quality and accuracy of the data used to construct cost and revenue functions. If the data is poor and inaccurate, the conclusions drawn on the basis of the data are flawed. For example, if fixed costs are underestimated, the level of output required to break even will be higher than suggested by the break-even chart. However, in this case Carl's financial information does seem accurate.

It is assumed that the total revenue and total cost lines are linear

or straight. This may not always be the case. For example, a business may have to offer discounts on large orders, so total revenues fall at high outputs. In this case the total revenue line would rise and then fall, and be curved. A business can lower costs by buying in bulk. So costs may fall at high outputs and the total cost function will be curved. This might be a problem for Carl in the future once his business is established and starts to grow.

When Carl is using break-even analysis he needs to be aware of these limitations. However, in the early stages of business development break-even may be helpful because the business is operating at a fairly simple level.

(18 marks)