

ECON 110, Prof. Hogendorn

Problem Set 5 Answers

1. *Benetton_a*

- (a) Since the price-earnings ratio is 6.5, that means that

$$\frac{\$1.2}{E} = 6.5 \Rightarrow E = \frac{\$1.2}{6.5} = \$0.18 \text{ billion}$$

The market allows you to buy \$1 of *current* Benetton earnings for about one-third of the price of \$1 of current H&M earnings. The only way that could be an equilibrium is if market participants expect H&M's future earnings to rise faster than Benetton's.

- (b) Yes. This indicates that the total cost component of Benetton's profits is much higher than for H&M. So the implication is that any future growth in revenue will likely coincide with a much larger increase in costs for Benetton. Thus, even if the market expects both companies to have the same growth in sales (i.e. total revenue), it would still expect Benetton to have a lower increase in earnings.

2. *FordToyota_a*

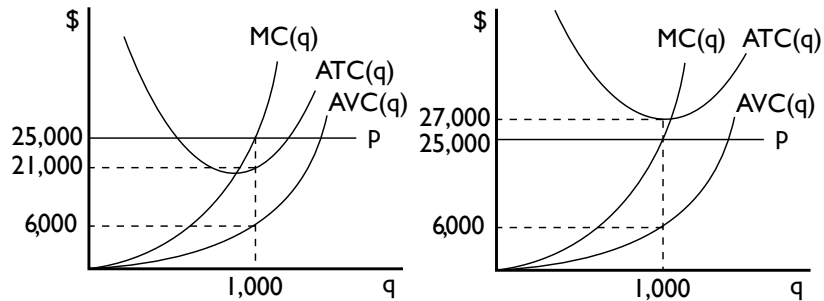
- (a) By inverting the production function, we find that $L(q) = \left(\frac{q}{316}\right)^4$. Then total variable cost is $TVC(q) = 0.000006q^4$, average variable cost is $AVC(q) = 0.000006q^3$, and marginal cost is the derivative of total variable cost, or $MC(q) = 0.000025q^3$.

- (b) Operating profit is

$$\pi_T = (p - AVC(1000))1000 = (25000 - 6000)1000 = 19,000,000$$

Net profit is $\Pi_T = \pi_T - F = 19,000,000 - 15,000,000 = 4,000,000$.

The graph looks something like the left panel below:



- (c) Ford has precisely the same variable costs, so it also has the same marginal cost, average variable cost, and operating profit. The only difference is the net profit, which is exactly \$6,000,000 less, or $\Pi_F = -2,000,000$. The graph is like the right panel above.
- (d) The operating profit will grow by 5% each year, since both its components, revenue and variable cost, grow by 5%. Thus, the discounted present value formula is:

$$\frac{1.05\pi_T - F}{1.10} + \frac{1.05^2\pi_T - F}{1.10^2} + \frac{1.05^3\pi_T - F}{1.10^3} + \frac{1.05^4\pi_T - F}{1.10^4} + \frac{1.05^5\pi_T - F}{1.10^5}$$

Looking at this equation, it makes more sense to evaluate the two separately, because this is equivalent to the PV of the fixed cost discounted at 10% and the PV of the *current* operating profit discounted at only 5%. These are

$$PV = \pi_T (1.05^{-1} + 1.05^{-2} + 1.05^{-3} + 1.05^{-4} + 1.05^{-5}) = 82,260,057$$

and for the fixed cost

$$PV = F (1.10^{-1} + 1.10^{-2} + 1.10^{-3} + 1.10^{-4} + 1.10^{-5}) = 56,861,801$$

Thus, the total value of the factory is $82,260,057 - 56,861,801 = 25,398,256$.

3. *Low_a*. At the lowest point on the AC curve, the slope is 0:

$$\frac{dAC}{dq} = -\frac{50}{q^2} + 0.0256 = 0 \Rightarrow q^2 = 1953.125 \Rightarrow q = 44.2$$

Setting MC=AC gives us

$$\frac{50}{q} + 0.0256q = 0.0512q \Rightarrow \frac{50}{q} = 0.0256q \Rightarrow q^2 = 1953.125 \Rightarrow q = 44.2$$

Either method gives the same answer.