Lecture 4

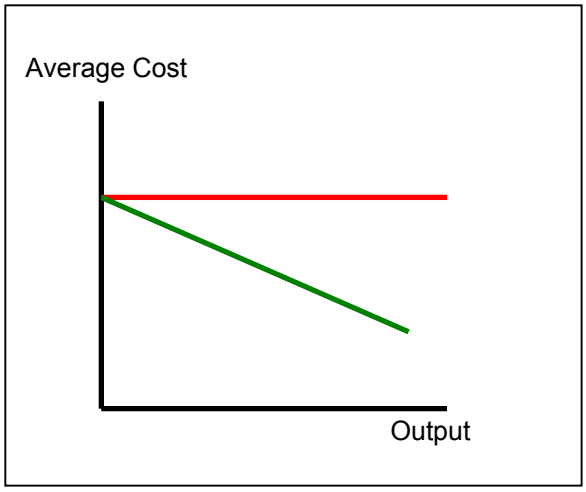
Economies of Scale and International Trade

One reason for specialisation is 'comparative advantage'. Another is 'economies of scale': the cost of producing commodity X falls as more of X is produced. Consequently, in producing X, large firms have a cost advantage over small firms. In this lecture we explore this source of cost advantage/disadvantage. **But, in so doing, we have to depart from our assumption of competitive markets.**

We have, so far, employed the assumption of **constant returns to scale**: a doubling of all inputs will lead to a doubling of output. If the cheapest way of producing one unit of output is using K_1 capital and L_1 labour, then the cheapest way of producing 100 units of output is using $100K_1$ capital and $100L_1$ labour: so AC is unchanged, regardless of output produced.
If $y = f(K, L)$ is a production function such that increasing all inputs by a factor of λ, leads to output increasing by a factor λ^k:

$$\lambda^k y = f(\lambda k, \lambda L) \qquad (1)$$

then k=1, implies constant returns to scale; k>1, implies increasing returns to scale; k<1, implies decreasing returns to scale.
Under CRS, the AC curve is constant; under IRS, it is falling:



There are two sources of **economies of scale** to a firm: *external* and *internal*.
External economies of scale depends on the size of the industry, not on the size of the firm.
Internal economies of scale depends on the size of the firm, not on the size of the industry.

An example of external economies of scale are the benefits of 'industrial clusters': computers and Silicon Valley. This is a relatively new topic in industrial development and the benefits of clustering are hard to quantify.

Internal economies of scale are easier to conceptualise and measure, because they are a 'technological' phenomenon.

Imperfect Competition: Monopoly

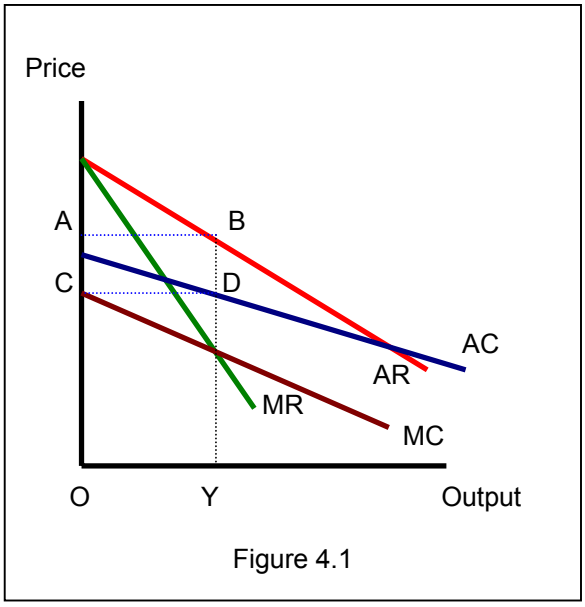


Figure 4.1

Points to note in Figure 4.1: equilibrium is at X where MR=MC.
At X, OA is monopoly price, OY is monopoly output; OC is monopoly AC; ABCD is monopoly profit.

Suppose the AR equation is: $p = \alpha + \beta y, \beta < 0$. Then *TR*= $py = (\alpha + \beta y)y$ and *MR* is the change in TR that results from output (y) being increased by one unit[1]. So $MR = (\alpha + \beta y) + \beta y = p + \beta y < p$ since $\beta < 0$ and $p - MR = -\beta y > 0$ since $\beta < 0$.

Similarly, *TC=F+c(y)y* and $AC = \frac{F}{y} + \frac{c(y)}{y}$. Suppose there is IRS, so that marginal cost (the cost of producing an additional unit of output) falls. Then average cost falls for two reasons:

(i) AFC falls because fixed costs are being spread over more units of output

(ii) AVC falls because, marginal cost is falling

The point is: *there could be economies of scale even without IRS, but the existence of IRS contributes to economies of scale.*

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[1] $MR = TR(y+1) - TR(y) = (p + dp)(y + dy) - py = pdy + ydp$

Imperfect Competition: Monopolistic Competition

Cases of pure monopoly are rare. So, the assumption is that profits attract other firms into the industry but the number of firms is limited because of 'barriers to entry'. This leads to **oligopoly** but the problem here is that there is *interdependence between firms* which must be taken account of. To get around this, economists look at **monopolistic competition** which occurs when a there are a large number of firms each producing a commodity which is slightly differentiated from those produced by its rivals.

Large numbers means that interdependence is not a problem.
Differentiated products means demand curve is downward sloping.

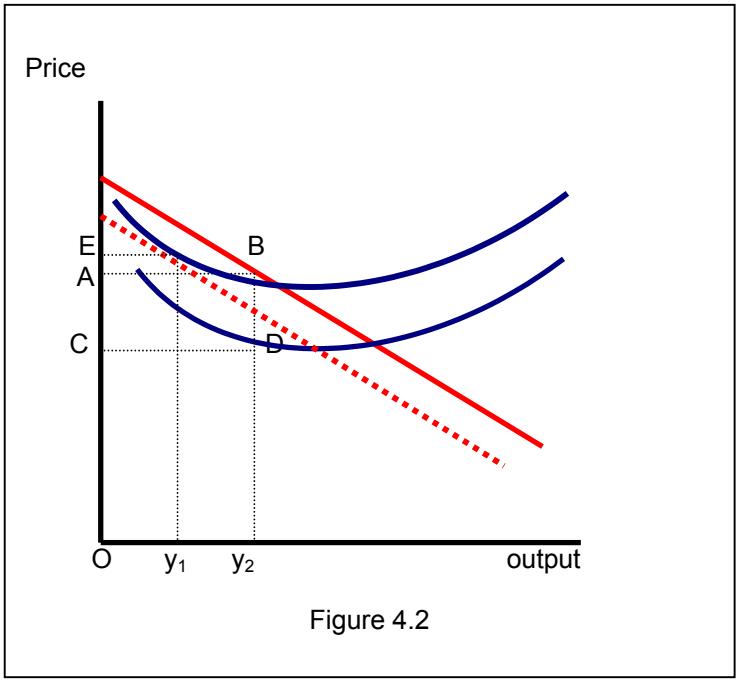

Figure 4.2

Entry of new firms competes away profits ABCD: demand falls and costs rise (why?). At new output level, y_1, firm is just breaking even charging price OE.

Costs, Prices and the Number of Firms

The cost function can be written:

$$AC = F/y + C(y)/y = N(F/Y) + C(y)/y \qquad (2)$$

where Y = total output. So, as the number of firms, N, increases, AC rises.
The demand function can be written as:

$$p = \bar{p} + \beta[s - (1/N)] \qquad (3)$$

where: $\bar{p}$ is average price and $s = y/Y$ is the share of the firm in total output (Interpret). So, the demand function can be written:

$$p = \alpha + \beta^{*} y \qquad (4)$$

where: $\alpha = \overline{p} - \beta / N$ and $\beta^* = \beta / Y$

So:

$$p - MR = -\beta^* y \Rightarrow MR = p + \beta(y/Y) = MC$$
$$\Rightarrow p = MC - \beta s \quad (5)$$

When $p = \overline{p}, s = 1/N$ so (5) becomes:

$$\overline{p} = MC - \beta(1/N) \quad (6)$$

So when N increases, $\overline{p}$ falls.

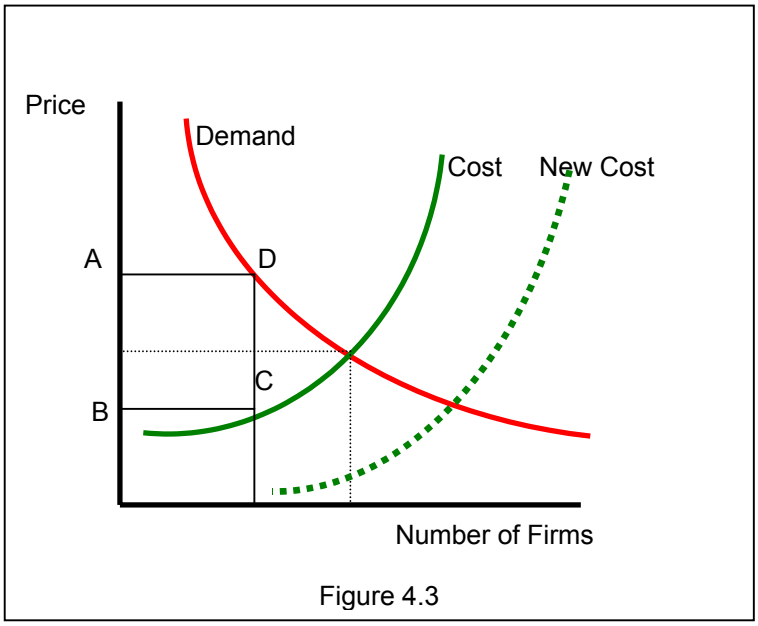

Figure 4.3

Trade and Monopolistic Competition

Trade increases the size of the market so that *Y* the total output produced increases. Consequently, for a given number of firms, N, this increase in the size of the market reduces AC for every firm (see equation (3)). However, the demand curve does not change (see equation (7)). So at the new equilibrium, there are more firms and a lower price.

Economies of scale interact with comparative advantage to produce trade patterns.

If manufactures were a competitive industry, the 'North' would export manufactures and import raw materials; the 'South' would do the opposite. This would be the consequence of the North being capital-abundant and the South being labour-abundant and manufactures being capital-intensive and raw materials being labour-intensive.

If there was monopolistic competition in manufactures, then each firm would produce a slightly differentiated product. Manufacturing firms in the South would produce different types of product from manufacturing firms in the North. So North-South trade would have two aspects:

1. **Inter-industry trade**: The North exports manufactures to the South and the South exports raw materials to the North. This reflects comparative advantage. The pattern of inter-industry trade is predictable.
2. **Intra-industry trade**: The North exports *certain types of manufactured goods* to the South and the South exports *certain types of manufactured goods* to the North. This is due to economies of scale. The pattern of intra-industry trade is not predictable. Economies of scale prevent the North from producing the full range of manufactured products, so it relies on exports from the South for those that it does not produce.