

Complement to Topic 2: individual firm supply in a competitive market

These concepts are supposed to be known before taking ECON 480. This document is posted for your convenience only. For more information, please refer to

- Varian H.R., "Intermediate Microeconomics: a modern approach", sixth edition, Norton eds.

- or any Handbook or course material you used for your ECON 303 class.

Operation costs can be fixed (independent of quantity produced) or variable (depends on the volume of production). We use the following notations: F for fixed costs, $VC(q)$ where q is the volume of production for variable costs and $C(q) = F + VC(q)$ for total (operation) cost.

The cost function $C(q)$ is generally increasing ($C'(q) \geq 0$) and convex ($C''(q) \geq 0$) and we assume this is the case.

The marginal cost is $C'(q) = VC'(q)$. Given the assumptions on the cost function, it is increasing in q . The average cost is simply $AC(q) = \frac{C(q)}{q}$. Taking the derivative of $AC(q)$, we get that

$$AC'(q) = \frac{1}{q^2} [VC'(q) \cdot q - C(q)].$$

Then, $AC'(q) = 0$ (where the average cost is at its minimum) when $VC'(q) = \frac{C(q)}{q}$, i.e. when the marginal cost = average cost.

In a competitive market (i) there are many firms, (ii) firms sell identical products, (iii) in the long run, there is free entry. Given this, each firm is price-taker. Therefore, the revenue of the firm is $R(q) = p \times q$. Then, the firm produces as long as $p > C'(q)$ and in the absence of quantity constraint, it produces a quantity $q(p)$ such that $p = C'(q)$, provided that the profit is positive. This is the case as long as $p > AC(q)$. Given the marginal cost curve crosses the average cost curve at the minimum of the average cost (see above), profit is positive as long as $p > p_{min}$ where p_{min} is the minimum of the average cost. The supply curve of the firm is

$$q^F(p) = \begin{cases} q(p) \text{ such that } p = C'(q) & \text{if } p > p_{min} \\ 0 & \text{otherwise} \end{cases}$$