CH6 Sellers and Incentives

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CH6 Review

Perfectly Competitive Market

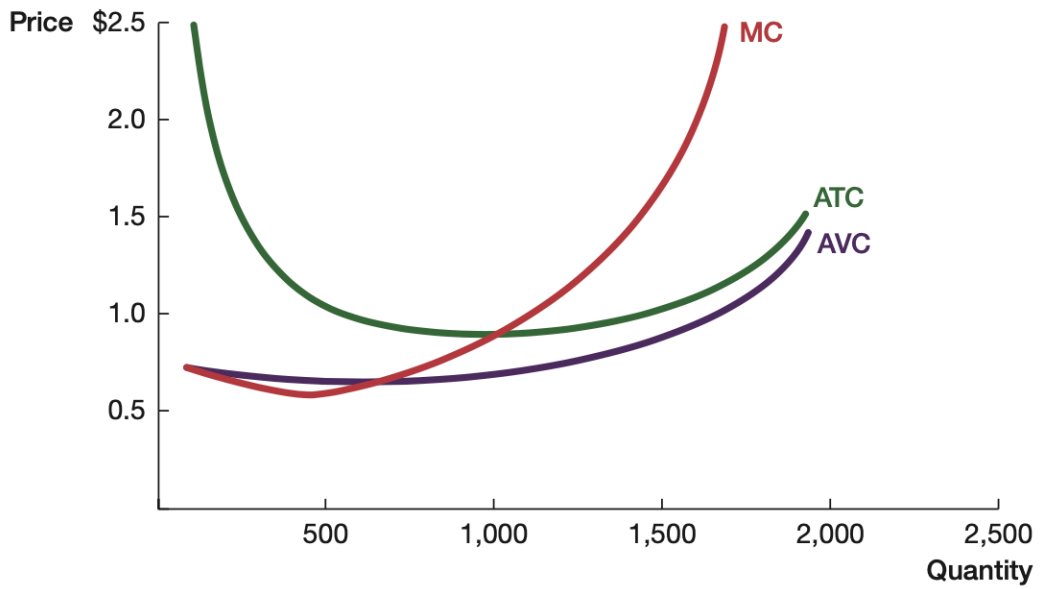
- Sellers in the market sell identical goods or service.
- No buyers or sellers in the market is powerful enough to influence the market price. $\Rightarrow$ Price takers
- There are free entry and exit in the market.
- The goal of sellers is to maximize profit.

Production

- **Production** is to transform inputs into outputs.
- In the short run, only some of the inputs can be varied.
  $\Rightarrow$ Labor is a variable factor of production.
- In the long run, all of the inputs can be varied.
  $\Rightarrow$ Capital is a fixed factor of production.
- Marginal product increase at first, then decrease and finally gets < 0.

Cost

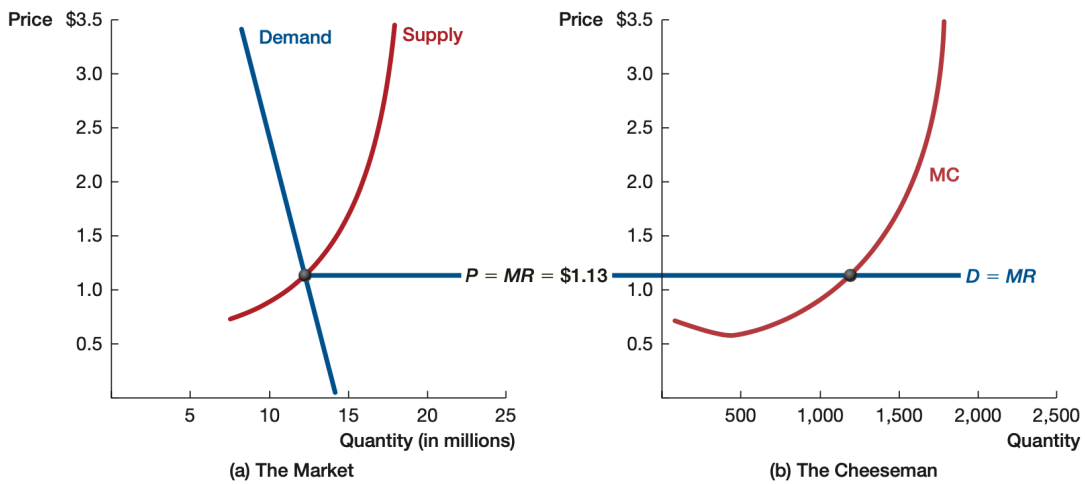
- **Variable costs** change as the level of output changes.
- **Fixed costs** do not change as the level of output changes.
- **Marginal cost (MC)** $= \frac{\text{dTC}}{\text{dQ}}$.
- Ex. If $\text{TC} = 2\text{Q}^2 + 5\text{Q} + 4$, $\text{MC} = 4\text{Q} + 5$.



- MC intersects AVC and ATC at their minimums.

Revenue

- Total Revenue = Price × Quantity sold.
- Marginal revenue (MR) = $\frac{\text{dTR}}{\text{dQ}}$
- Profit is maximized when MR = MC.
- In a perfectly competitive market, MR = price.



- **Economic profits** are total revenue minus both explicit and implicit costs (ex. opportunity costs sacrificing to run the company).

Supply curves

- Short run: the MC curve above AVC.
- The firm should **shutdown** if price is less than AVC.

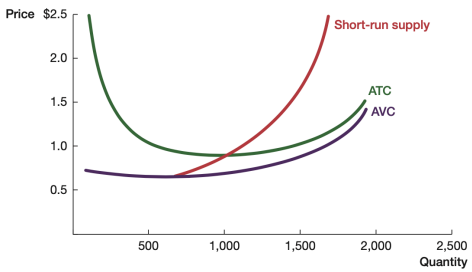


Figure: Short-run supply

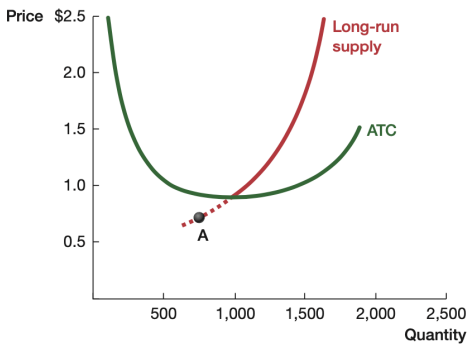
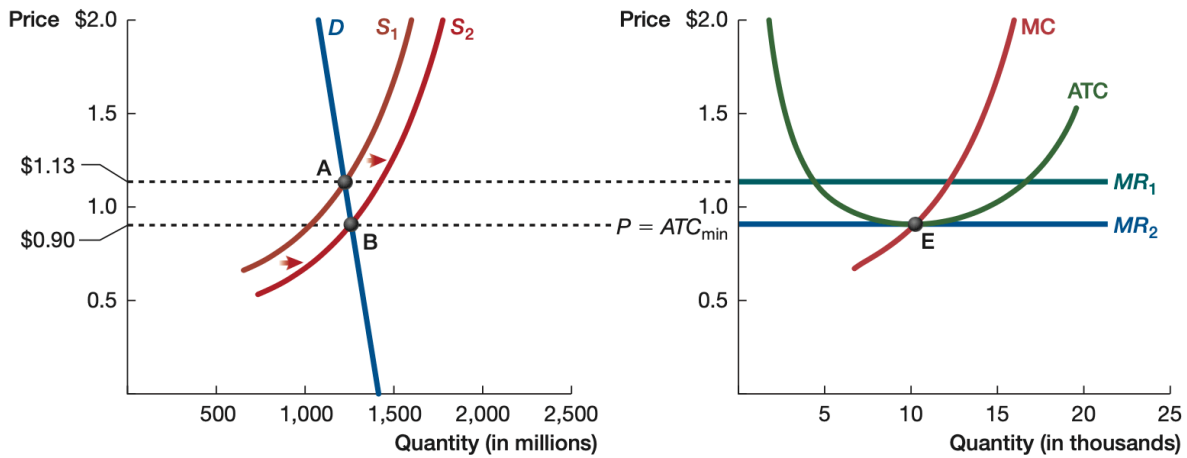


Figure: Short-run supply

- Long run: the MC curve above ATC.
- The firm should **exit** if price is less than ATC.

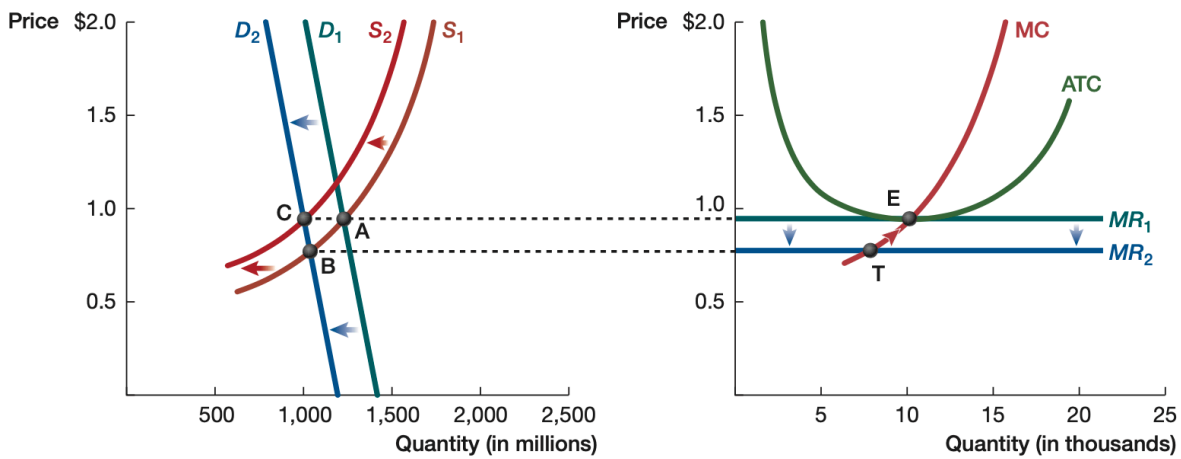
Firm Entry (long-run analysis)

- If there's positive profits, many firms will realize and **enter** the market.
- This will cause the market price to fall until minimum ATC and thus resulting in zero economic profit.



Firm Exit (long-run analysis)

- If the demand curve shift leftfoward, the equilibrium price drops.
- This makes firms in the industry make negative profits.
- The leftforward shift of supply curve will raise the price up until minimum ATC and thus resulting in zero economic profit again.



CH6 Exercises

Exercise1: Problem6-5 (modified)

Jeremy worked at a bank with a monthly salary of $1,500. He decided to quit his job and open a bookstore in his neighborhood. He now pays $500 in rent, $80 in utilities, and $120 in wages every month. Suppose Jeremy sells 100 books at the price of $30 every month.

- How much accounting profit does Jeremy make every month?
- How much economic profit does Jeremy make every month?

Answer:

- Accounting profit $= 30 \times 100 - 500 - 80 - 120 = 2300$
- Economic profit $= 30 \times 100 - 500 - 80 - 120 - 1500 = 800$

Exercise2: Problem6-6

You are one of 5 identical firms (i.e., you all have the same costs) that sell widgets. Each day you have a fixed cost of \$9 to operate. The marginal cost of your first through fifth widgets are \$1, \$2, \$3, \$7, and \$8, respectively. You have a capacity constraint of 5. (produced in whole units)

a. What is the average variable cost (AVC) for a firm that produces 2 widgets?
b. What is the market-level quantity supplied given a price of \$2.50 in the short run?
c. Suppose the market-level demand is fixed at 18. In other words, there is perfectly inelastic demand. What is the equilibrium price in the short run?
d. Given perfect competition, what will be the price in the long run?

a. Two widgets have a variable cost of \$1 + \$2 = \$3, so the AVC is \$3/2 = \$1.5.

b. Each firm will want to supply 2 widgets as a third widget has a marginal cost of \$3 > price of \$2.50. And since price = 2.5 > 1.5 = AVC, the firm won't shutdown. Given there are 5 firms, this means the supply will be 10.

c. For the market supply to be 18, each firm must be willing to supply either 3 or 4 (i.e. 2 firms will supply 3 each and 3 firms will supply 4 each for a total of 18). The price that induces firms to supply either 3 or 4 is exactly \$7. Firms will be just indifferent between supplying the 4th widget as the marginal cost exactly equals the price.

d. The minimum average total cost (ATC) is \$5 at Q = 3. (At Q = 2, ATC is \$6; at Q = 4, ATC is \$5.50). Thus \$5 is the long-run price.

Exercise3 (required some calculus)

Suppose there are 100 identical firms in a perfectly competitive market, and each firm's total cost function is $TC = 100 + q^2$.

a. What's the short run supply curve?
b. If the market demand $Q^D = 840 - 10P$, what's the short run equilibrium? What's the output of each firm?
c. What's the long run equilibrium quantity and price? How many firms are there in the long run equilibrium?

Answer:

a. $\mathrm{MC} = \frac{\mathrm{dTC}}{\mathrm{dq}} = 2\mathrm{q},\ \mathrm{MC} = \mathrm{MR} = \mathrm{P} \Rightarrow 2\mathrm{q} = \mathrm{P} \Rightarrow \mathrm{q^s} = 0.5\mathrm{P}$

$\Rightarrow \mathrm{Q^s} = 100 \times \mathrm{q^s} = 100 \times 0.5\mathrm{P} = 50\mathrm{P}$

b. $\mathrm{Q^D} = 840 - 10\mathrm{P} = 50\mathrm{P} = \mathrm{Q^S}$

$\Rightarrow \mathrm{P^*} = 14,\ \mathrm{Q^*} = 700,\ \mathrm{q^*} = \frac{\mathrm{Q^*}}{100} = 7$

c. First, we need to know where minimum ATC is,

$\mathrm{ATC} = \frac{100}{\mathrm{q}} + \mathrm{q} = 100\mathrm{q}^{-1} + \mathrm{q} \Rightarrow \frac{\mathrm{dATC}}{\mathrm{dq}} = -100\mathrm{q}^{-2} + 1 = 0$

$\Rightarrow \mathrm{q}^2 = 100 \Rightarrow \mathrm{q^*} = 10,\ \mathrm{P^*} = \mathrm{MC} = 2 \times \mathrm{q^*} = 20$

$\Rightarrow \mathrm{Q^*} = 840 - 10 \times 20 = 640 \Rightarrow$ there are $\frac{640}{10} = 64$ firms.