

# Ch. 14: PERFECT PERFECT PERFECT PERFECT!!! Competition

Professor Sumner La Croix  
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## Characteristics of Perfect Competition

1. Many buyers and many sellers.
  2. The goods offered for sale are largely the same.
  3. Firms can freely enter or exit the market.
- Because of 1 & 2, each buyer and seller is a "price taker" – takes the price as given.

## The Revenue of a Competitive Firm

- Total revenue ( $TR$ )  $TR = P \times Q$
- Average revenue ( $AR$ )  $AR = \frac{TR}{Q} = P$
- Marginal revenue ( $MR$ ):  
The change in  $TR$  from selling one more unit.  
 $MR = \frac{\Delta TR}{\Delta Q}$

### ACTIVE LEARNING 1

#### Calculating $TR$ , $AR$ , $MR$

Fill in the empty spaces of the table.

| Q | P    | TR   | AR   | MR   |
|---|------|------|------|------|
| 0 | \$10 |      | n/a  |      |
| 1 | \$10 |      | \$10 |      |
| 2 | \$10 |      |      |      |
| 3 | \$10 |      |      |      |
| 4 | \$10 | \$40 |      | \$10 |
| 5 | \$10 | \$50 |      |      |

### ACTIVE LEARNING 1

#### Answers

Fill in the empty spaces of the table.

| Q | P    | $TR = P \times Q$ | $AR = \frac{TR}{Q}$ | $MR = \frac{\Delta TR}{\Delta Q}$ |
|---|------|-------------------|---------------------|-----------------------------------|
| 0 | \$10 | \$0               | n/a                 |                                   |
| 1 | \$10 | \$10              | \$10                | \$10                              |
| 2 | \$10 | \$20              | \$10                | \$10                              |
| 3 | \$10 | \$30              | \$10                | \$10                              |
| 4 | \$10 | \$40              | \$10                | \$10                              |
| 5 | \$10 | \$50              | \$10                | \$10                              |

Notice that  $MR = P$

## $MR = P$ for a Competitive Firm

- A competitive firm can keep increasing its output without affecting the market price.
- So, each one-unit increase in  $Q$  causes revenue to rise by  $P$ , i.e.,  $MR = P$ .

$MR = P$  is only true for firms in competitive markets.

### Profit Maximization

- What  $Q$  maximizes the firm's profit?
- To find the answer, "**think at the margin.**"  
If increase  $Q$  by one unit, revenue rises by  $MR$ , cost rises by  $MC$ .
- If  $MR > MC$ , then increase  $Q$  to raise profit.
- If  $MR < MC$ , then reduce  $Q$  to raise profit.

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### Profit Maximization

*(continued from earlier exercise)*

| $Q$ | $TR$ | $TC$ | Profit | $MR$ | $MC$ | $\Delta\text{Profit} = MR - MC$ |
|-----|------|------|--------|------|------|---------------------------------|
| 0   | \$0  | \$5  | -\$5   |      |      |                                 |
| 1   | 10   | 9    | 1      | \$10 | \$4  | \$6                             |
| 2   | 20   | 15   | 5      | 10   | 6    | 4                               |
| 3   | 30   | 23   | 7      | 10   | 8    | 2                               |
| 4   | 40   | 33   | 7      | 10   | 10   | 0                               |
| 5   | 50   | 45   | 5      | 10   | 12   | -2                              |

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### MC and the Firm's Supply Decision

Rule:  $MR = MC$  at the profit-maximizing  $Q$ .

At  $Q_a$ ,  $MC < MR$ .  
So, increase  $Q$  to raise profit.

At  $Q_b$ ,  $MC > MR$ .  
So, reduce  $Q$  to raise profit.

At  $Q_1$ ,  $MC = MR$ .  
Changing  $Q$  would lower profit.

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### MC and the Firm's Supply Decision

If price rises to  $P_2$ , then the profit-maximizing quantity rises to  $Q_2$ .

The  $MC$  curve determines the firm's  $Q$  at any price.

Hence, the  $MC$  curve is the firm's supply curve.

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### Shutdown vs. Exit

- **Shutdown:**  
A short-run decision not to produce anything because of market conditions.
- **Exit:**  
A long-run decision to leave the market.
- A key difference:
  - If shut down in SR, must still pay  $FC$ .
  - If exit in LR, zero costs.

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### A Firm's Short-run Decision to Shut Down

- Cost of shutting down: revenue loss =  $TR$
- Benefit of shutting down: cost savings =  $VC$  (firm must still pay  $FC$ )
- So, shut down if  $TR < VC$
- Divide both sides by  $Q$ :  $TR/Q < VC/Q$
- So, firm's decision rule is:  
$$\text{Shut down if } P < AVC$$

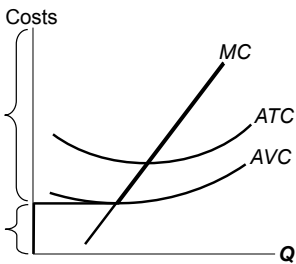
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### A Competitive Firm's SR Supply Curve

The firm's SR supply curve is the portion of its MC curve above

If  $P > AVC$ , then firm produces  $Q$  where  $P = MC$ .

If  $P < AVC$ , then firm shuts down (produces  $Q = 0$ ).



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### The Irrelevance of Sunk Costs

- **Sunk cost:** a cost that has already been committed and cannot be recovered
- Sunk costs should be irrelevant to decisions; you must pay them regardless of your choice.
- $FC$  is a sunk cost: The firm must pay its fixed costs whether it produces or shuts down.
- So,  $FC$  should not matter in the decision to shut down.

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### A Firm's Long-Run Decision to Exit

- Cost of exiting the market: revenue loss =  $TR$
- Benefit of exiting the market: cost savings =  $TC$  (zero  $FC$  in the long run)
- So, firm exits if  $TR < TC$
- Divide both sides by  $Q$  to write the firm's decision rule as:

$$\text{Exit if } P < ATC$$

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### A New Firm's Decision to Enter Market

- In the long run, a new firm will enter the market if it is profitable to do so: if  $TR > TC$ .
- Divide both sides by  $Q$  to express the firm's entry decision as:

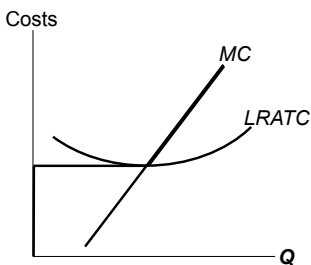
$$\text{Enter if } P > ATC$$

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### The Competitive Firm's Supply Curve

The firm's LR supply curve is the portion of its MC curve above  $LRATC$ .



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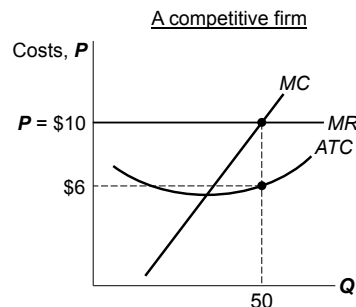
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### ACTIVE LEARNING 2

#### Identifying a firm's profit

Determine this firm's total profit.

Identify the area on the graph that represents the firm's profit.



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**ACTIVE LEARNING 2**  
**Answers**

A competitive firm

Profit per unit  
 $= P - ATC$   
 $= \$10 - 6$   
 $= \$4$

Total profit  
 $= (P - ATC) \times Q$   
 $= \$4 \times 50$   
 $= \$200$

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**ACTIVE LEARNING 3**  
**Identifying a firm's loss**

Determine this firm's total loss, assuming  $AVC < \$3$ .

Identify the area on the graph that represents the firm's loss.

A competitive firm

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**ACTIVE LEARNING 3**  
**Answers**

A competitive firm

Total loss  
 $= (ATC - P) \times Q$   
 $= \$2 \times 30$   
 $= \$60$

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**Market Supply: Assumptions**

- 1) All existing firms and potential entrants have identical costs.
- 2) Each firm's costs do not change as other firms enter or exit the market.
- 3) The number of firms in the market is
  - fixed in the short run (due to fixed costs)
  - variable in the long run (due to free entry and exit)

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**The SR Market Supply Curve**

- As long as  $P \geq AVC$ , each firm will produce its profit-maximizing quantity, where  $MR = MC$ .
- Recall from Chapter 4:  
At each price, the market quantity supplied is the sum of quantities supplied by all firms.

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**The SR Market Supply Curve**

Example: 1000 identical firms  
 At each  $P$ , market  $Q^s = 1000 \times$  (one firm's  $Q^s$ )

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### Entry & Exit in the Long Run

- In the LR, the number of firms can change due to entry & exit.
- If existing firms earn positive economic profit,
  - new firms enter, SR market supply shifts right.
  - $P$  falls, reducing profits and slowing entry.
- If existing firms incur losses,
  - some firms exit, SR market supply shifts left.
  - $P$  rises, reducing remaining firms' losses.

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### The Zero-Profit Condition

- **Long-run equilibrium:**  
The process of entry or exit is complete – remaining firms earn zero economic profit.
- Zero economic profit occurs when  $P = ATC$ .
- Since firms produce where  $P = MR = MC$ , the zero-profit condition is  $P = MC = ATC$ .
- Recall that  $MC$  intersects  $ATC$  at minimum  $ATC$ .
- Hence, in the long run,  $P = \text{minimum } ATC$ .

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### Why Do Firms Stay in Business if Profit = 0?

- Recall, economic profit is revenue minus all costs – including implicit costs, like the opportunity cost of the owner's time and money.
- In the zero-profit equilibrium,
  - firms earn enough revenue to cover these costs
  - accounting profit is positive

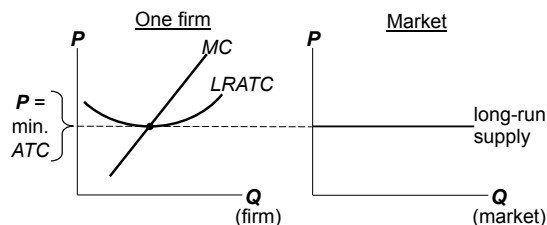
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### The LR Market Supply Curve

In the long run, the typical firm earns zero profit.

The LR market supply curve is horizontal at  $P = \text{minimum } ATC$ .

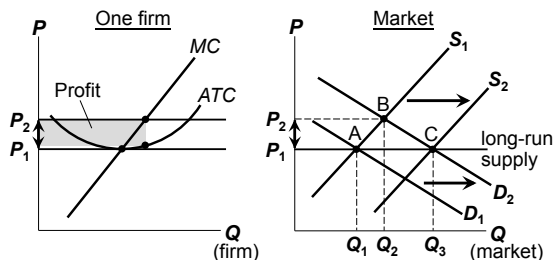


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### SR & LR Effects of an Increase in Demand

A firm begins in  $P_1$  but then an increase in demand leads to  $P_2$  and driving profits to zero. This causes entry, increasing supply and restoring long-run equilibrium, reducing  $P$  to  $P_1$ .



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### Why the LR Supply Curve Might Slope Upward

- The LR market supply curve is horizontal if
  - 1) all firms have identical costs, and
  - 2) costs do not change as other firms enter or exit the market.
- If either of these assumptions is not true, then LR supply curve slopes upward.

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### 1) Firms Have Different Costs

- As  $P$  rises, firms with lower costs enter the market before those with higher costs.
- Further increases in  $P$  make it worthwhile for higher-cost firms to enter the market, which increases market quantity supplied.
- Hence, LR market supply curve slopes upward.
- At any  $P$ ,
  - For the marginal firm,  $P = \text{minimum } ATC$  and profit = 0.
  - For lower-cost firms, profit > 0.

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### 2) Costs Rise as Firms Enter the Market

- In some industries, the supply of a key input is limited (e.g., amount of land suitable for farming is fixed).
- The entry of new firms increases demand for this input, causing its price to rise.
- This increases all firms' costs.
- Hence, an increase in  $P$  is required to increase the market quantity supplied, so the supply curve is upward-sloping.

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### CONCLUSION: The Efficiency of a Competitive Market

- Profit-maximization:  $MC = MR$
- Perfect competition:  $P = MR$
- So, in the competitive eq'm:  $P = MC$
- Recall,  $MC$  is cost of producing the marginal unit.  $P$  is value to buyers of the marginal unit.
- So, the competitive eq'm is efficient, maximizes total surplus.
- In the next chapter, monopoly: pricing & production decisions, deadweight loss, regulation.

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