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Firms in Competitive Markets

PRINCIPLES OF MICROECONOMICS FOURTH CANADIAN EDITION

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PowerPoint® Slides
by Ron Cronovich
Canadian adaptation by Marc Prud'Homme

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In this chapter, look for the answers to these questions:

- What is a perfectly competitive market?
- What is marginal revenue? How is it related to total and average revenue?
- How does a competitive firm determine the quantity that maximizes profits?
- When might a competitive firm shut down in the short run? Exit the market in the long run?
- What does the market supply curve look like in the short run? In the long run?

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Introduction: A Scenario

- Three years after graduating, you run your own business.
- You have to decide how much to produce, what price to charge, how many workers to hire, etc.
- What factors should affect these decisions?
 - Your costs (studied in preceding chapter)
 - How much competition you face
- We begin by studying the behavior of firms in perfectly competitive markets.

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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.

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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. $MR = \frac{\Delta TR}{\Delta Q}$

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ACTIVE LEARNING 1:

Exercise

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 | | |

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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 | | | \$10 |
| 3 | \$10 | \$30 | \$10 | \$10 |
| 4 | \$10 | \$40 | \$10 | \$10 |
| 5 | \$10 | \$50 | \$10 | |

Notice that
 $MR = P$

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$MR = P$ 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.

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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)

At any Q with $MR > MC$, increasing Q raises profit.

At any Q with $MR < MC$, reducing Q raises profit.

| 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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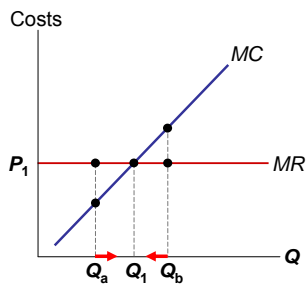
MC and the Firm's Supply Decision

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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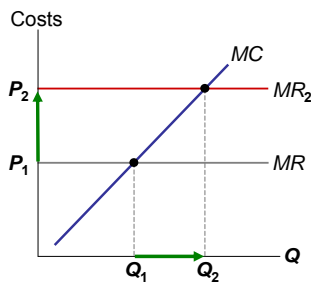
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MC and the Firm's Supply Decision

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 firm that shuts down temporarily must still pay its fixed costs. A firm that exits the market does not have to pay any costs at all, fixed or variable.

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A Firm's Short-Run Decision to Shut Down

- If firm shuts down temporarily,
 - revenue falls by TR
 - costs fall by VC
- So, the firm should shut down if $TR < VC$.
- Divide both sides by Q : $TR/Q < VC/Q$
- So we can write the firm's decision as:

Shut down if $P < AVC$

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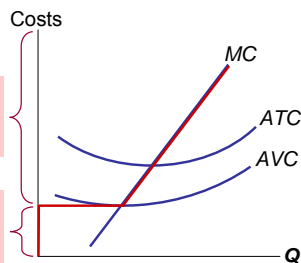
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A Competitive Firm's SR Supply Curve

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

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

- If firm exits the market,
 - revenue falls by TR
 - costs fall by TC
- So, the firm should exit if $TR < TC$.
- Divide both sides by Q to rewrite the firm's decision as:

Exit if $P < ATC$

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A New Firm's Decision to Enter the 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:

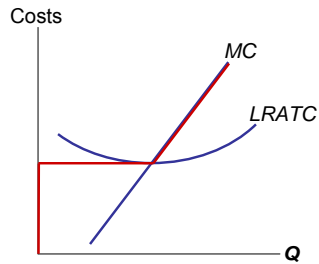
Enter if $P > ATC$

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The Competitive Firm's LR Supply Curve

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



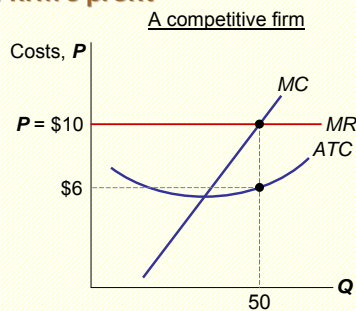
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ACTIVE LEARNING 2A: Identifying a firm's profit

Determine this firm's total profit.

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

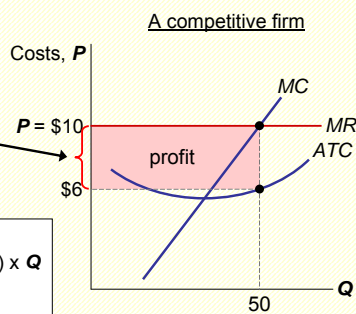


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ACTIVE LEARNING 2A: Answers

$$\begin{aligned}\text{profit per unit} &= P - ATC \\ &= \$10 - 6 \\ &= \$4\end{aligned}$$

$$\begin{aligned}\text{Total profit} &= (P - ATC) \times Q \\ &= \$4 \times 50 \\ &= \$200\end{aligned}$$

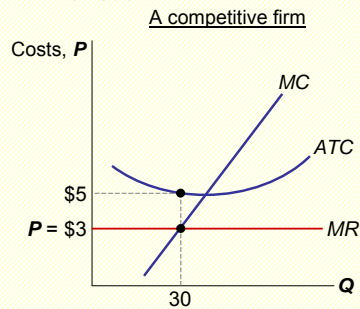


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ACTIVE LEARNING 2B: Identifying a firm's loss

Determine this firm's total loss.

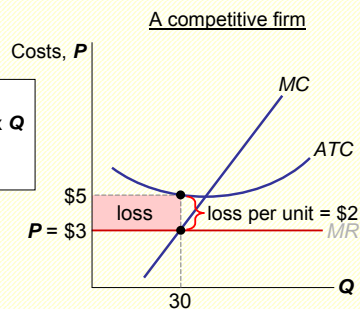
Identify the area on the graph that represents the firm's loss.



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ACTIVE LEARNING 2B: Answers

$$\begin{aligned}\text{Total loss} &= (ATC - P) \times Q \\ &= \$2 \times 30 \\ &= \$60\end{aligned}$$



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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)

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 quantity supplied by each firm.

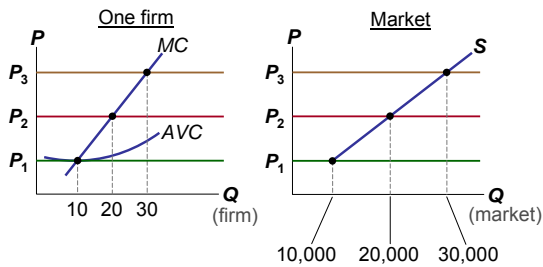
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The SR Market Supply Curve

Example: 1000 identical firms.

At each P , market $Q^s = 1000 \times (\text{one firm's } Q^s)$



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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 curve shifts right.
 - P falls, reducing firms' profits.
 - Entry stops when firms' economic profits have been driven to zero.

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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 incur losses,
 - Some will exit the market.
 - SR market supply curve shifts left.
 - P rises, reducing remaining firms' losses.
 - Exit stops when firms' economic losses have been driven to zero.

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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, $P = \text{minimum } ATC$.

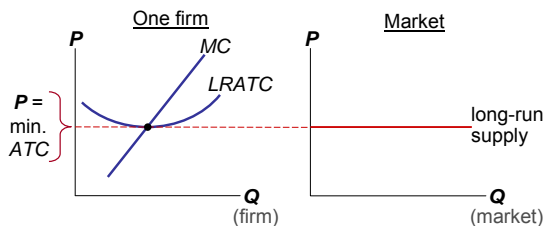
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The LR Market Supply Curve

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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Why Do Firms Stay in Business if Profit = 0?

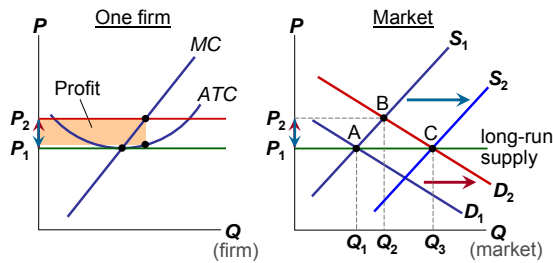
- Recall, economic profit is revenue minus all costs – including implicit costs, like the opportunity cost of the owner's time and money.
- In the zero-profit equilibrium, firms earn enough revenue to cover these costs.

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SR & LR Effects of an Increase in Demand

A firm begins in but then an increase
...leading to ...driving profits to zero ...reduce entry,
profits for a time and restoring long-run eq'm. ...reducing P ...



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Why the LR Supply Curve Might Slope Upward

- The LR market supply curve is horizontal if
 - all firms have identical costs, and
 - 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., there's a fixed amount of land suitable for farming).
- 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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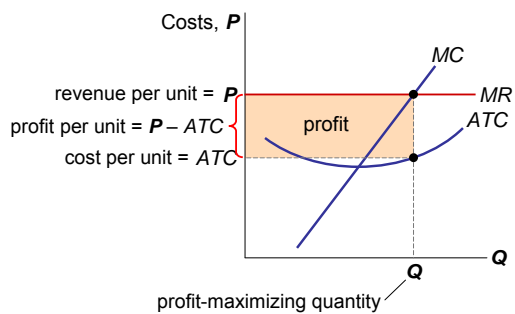
CHAPTER SUMMARY

- For a firm in a perfectly competitive market, price = marginal revenue = average revenue.
- If $P > AVC$, a firm maximizes profit by producing the quantity where $MR = MC$. If $P < AVC$, a firm will shut down in the short run.
- If $P < ATC$, a firm will exit in the long run.
- In the short run, entry is not possible, and an increase in demand increases firms' profits.
- With free entry and exit, profits = 0 in the long run, and P = minimum ATC .

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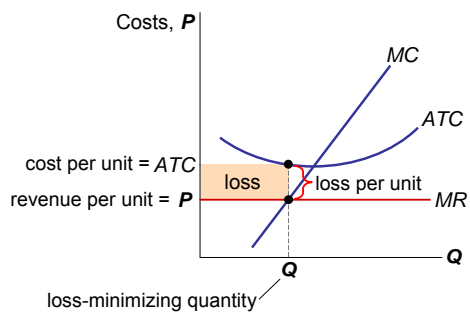
A Firm With Profits



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A Firm With Losses



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End: Chapter 14

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