EE 211
Principles of Microeconomics*

Firms in
Competitive Markets

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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?

IS A SHORT RUN DECISION

IS A LONG RUN DECISION

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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.

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.

4. PERFECT INFORMATION

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

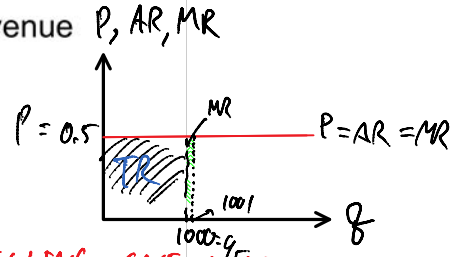
ACTIVE LEARNING 1:
Exercise

Fill in the empty spaces of the table.

Q	P	TR	AR	MR
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	

MR = P for a Competitive Firm

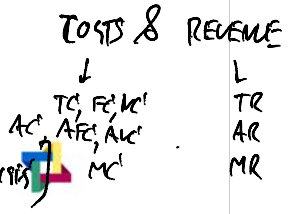
- A competitive firm can keep increasing its output without affecting the market price.
- So, each one-unit increase in **Q** causes revenue to rise by **P**, *i.e.*, *MR* = **P**.



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

WHAT YOU RECEIVE WHEN YOU ARE SELLING ONE MORE UNIT OF OUTPUT IS EQUAL TO MARKET PRICE OF THE PRODUCT.

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*.

$$\max \pi(q) = TR(q) - TC(q)$$

q ↖ CHOICE VARIABLE

- If *MR* > *MC*, then increase **Q** to raise profit. (20 > 10)
- If *MR* < *MC*, then reduce **Q** to raise profit.

$q^* = ? \rightarrow \max \pi$

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*	ΔProfit = *MR* – *MC*
0	$0	$5	–$5			
				$10	$4	$6
1	10	9	1			
				10	6	4
2	20	15	5			
				10	8	2
3	30	23	7			
				10	10	0
4	40	33	7			
				10	12	–2
5	50	45	5			

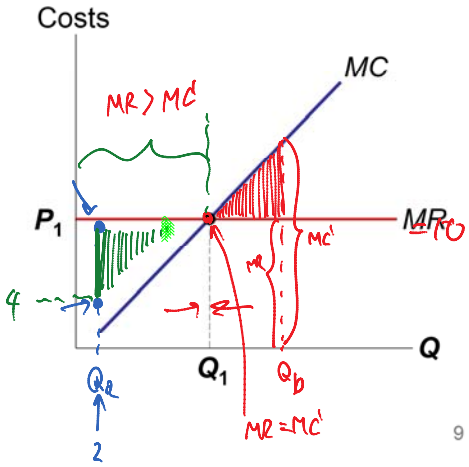
MC and the Firm's Supply Decision

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.



$\pi(q) = TR(q) - TC(q)$

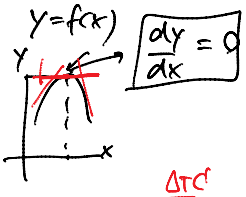
FIRST-ORDER CONDITION:

$\frac{d\pi(q)}{dq} = \frac{dTR(q)}{dq} - \frac{dTC(q)}{dq} = 0$

$= MR(q) - MC(q) = 0$

OUTPUT RULE: PRODUCE AT q WHERE $MR(q^*) = MC(q^*)$

"PROFIT MAXIMIZING CONDITION"



$\frac{\Delta TC}{\Delta q}$

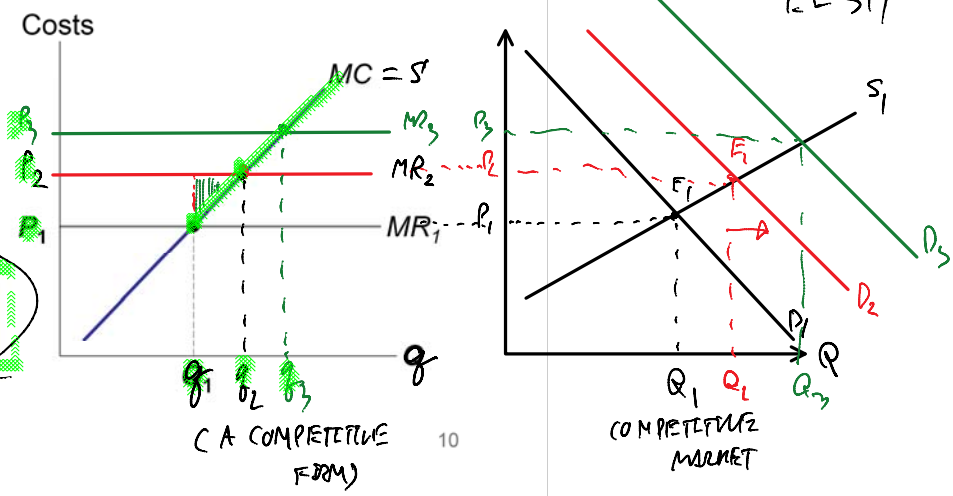
MC and the Firm's Supply Decision

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.



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

A Firm's Short-run Decision to Shut Down

2 ALTERNATIVES WHEN YOU FACES LOSSES ($TR < TC$)

① $q = 0$ [SHUT DOWN = STOP PRODUCING FOR A WHILE]

OR

② $q > 0$ [CONTINUE TO PRODUCE]

TO MAKE THIS DECISION, YOU MUST COMPARE

$\pi_{q=0}$ vs. $\pi_{q>0}$

$\pi_{q=0}$: SHUTDOWN

$\pi_{q>0}$: CONTINUE

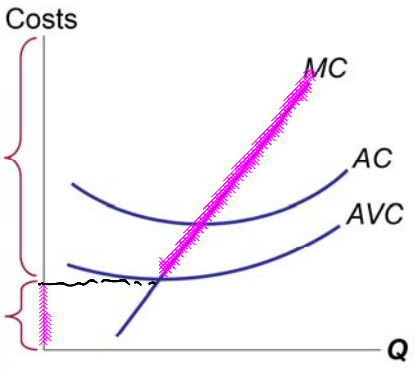
A Firm's Short-run Decision to Shut Down

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).



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.

A Firm's Long-Run Decision to Exit

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A Firm's Long-Run Decision to Exit

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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:

Enter if $P > AC$

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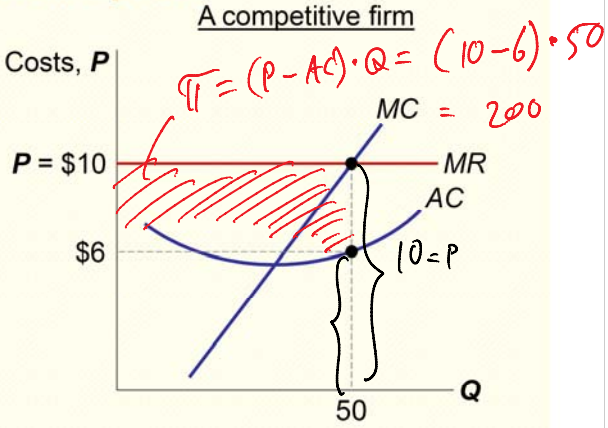
ACTIVE LEARNING 2A: Identifying a firm's profit

Determine this firm's total profit.

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



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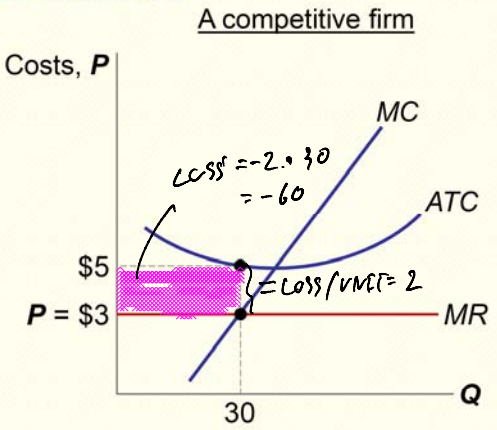
ACTIVE LEARNING 2B:
Identifying a firm's loss

Determine this firm's total loss.

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



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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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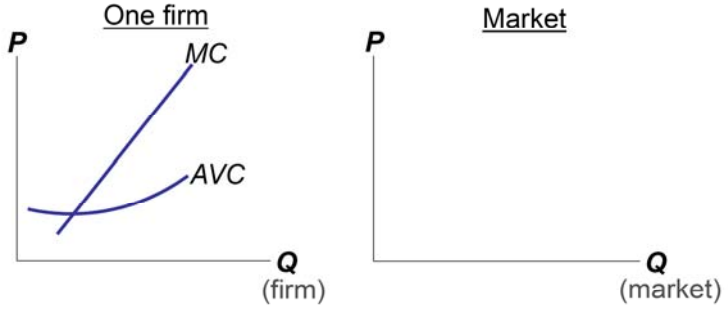
The SR Market Supply Curve

- 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 quantity supplied by each firm.

The SR Market Supply Curve

Example: 1000 identical firms.

At each P, market Q^S = 1000 x (one firm's Q^S)



Entry & Exit in the Long Run

Competition tends to drive economic profit down to zero

When a firm is making positive economic profit, it is earning more than the cost of all the resources required to produce the goods it sells.

This means that another firm could produce the same goods and in the process increase its owners' wealth.

Entry by new firms will cause price to fall until economic profit is driven down to zero.

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Corn Production

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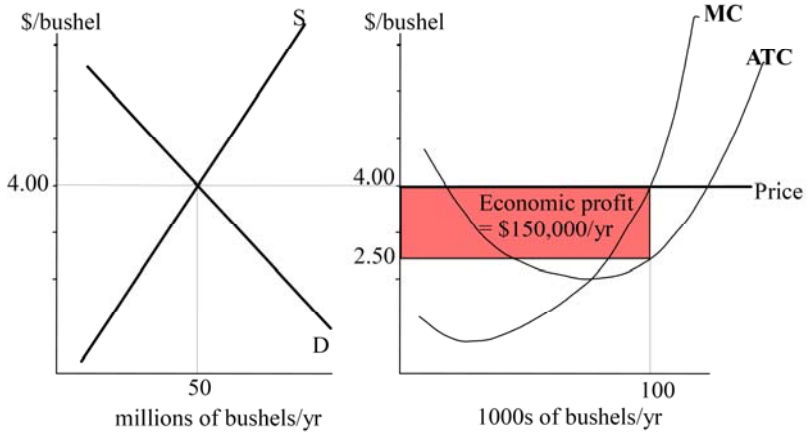
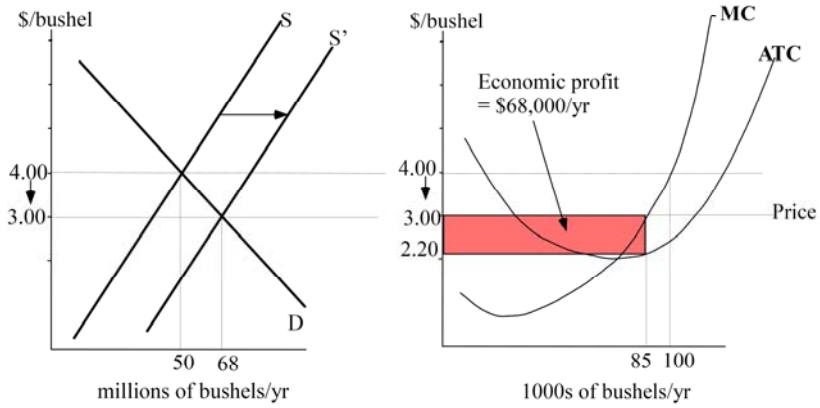
Consider an industry in which the current market price enables firms to earn a positive economic profit.



The existence of positive economic profits attracts new firms, shifting supply outward.

Price falls, making each firm's economic profit smaller than before.



As long as price remains above the minimum value of ATC, profits lure new entrants.

Supply continues to shift out until price falls to min ATC.

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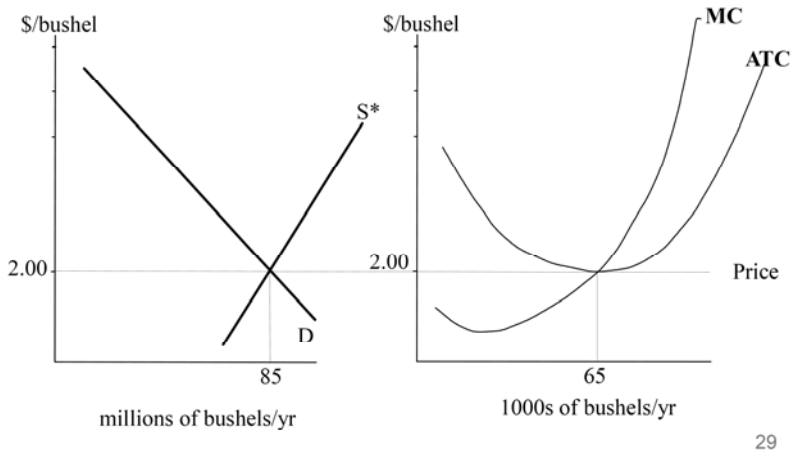
At that point economic profit is zero and there is no further incentive to enter.



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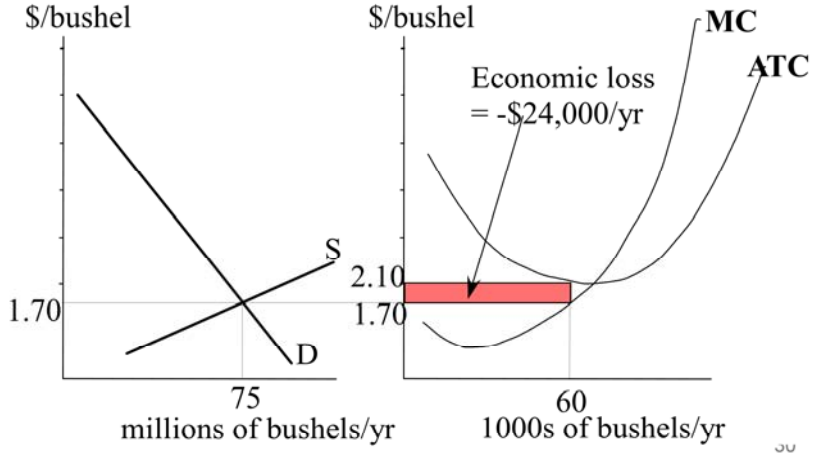
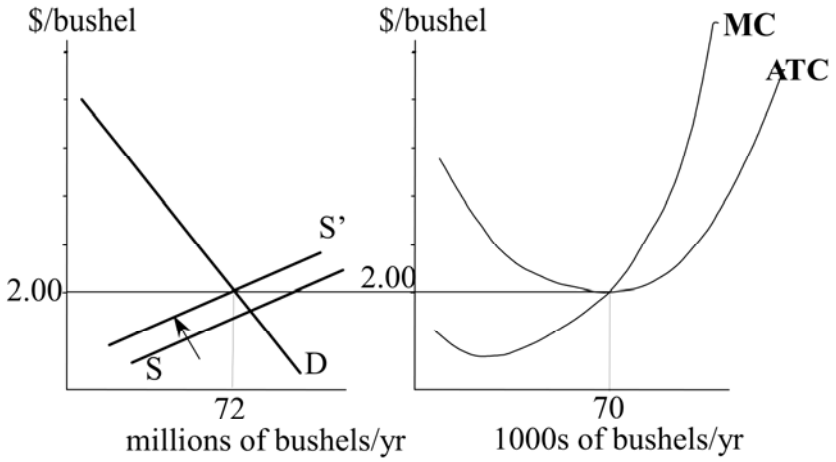
What if the firms are originally earning economic losses?



Supply continues to shift inward until price rises to min ATC.



Likewise, an industry in which firms are earning negative economic profit is one in which firms are failing to cover all the costs of the resources they use.

If this situation is expected to persist, some firms will go out of business.

Exit will continue until price rises to cover all resource costs.

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So in long-run equilibrium in a competitive industry, firms will earn zero economic profit.

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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 = 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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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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