

Principles of Economics

Discussion Session 5: Costs and the Supply Curve

Joe Wilske

Boston College

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Types of Costs

Imagine you own a restaurant...

- ❶ **Fixed Costs:** Costs that must be paid whether the restaurant is operating or not.
 - Rent, equipment leases, license renewal fees, ...
- ❷ **Variable Costs:** Costs that are only paid if the restaurant is operating.
 - Labor, food supplies, ...
- ❸ **Total Cost:** The sum of fixed and variable costs.
 - $TC = FC + VC$
- ❹ **Marginal Cost:** The cost of the *last unit produced*.
 - If you produce Q units, then
$$MC_Q = VC_Q - VC_{Q-1}, \text{ or equivalently}$$
$$MC_Q = TC_Q - TC_{Q-1} = FC + VC_Q - (FC + VC_{Q-1}) = VC_Q - VC_{Q-1}$$
- ❺ **Average Costs:** Just divide by the quantity produced.
 - $AFC = FC/Q, \quad AVC = VC/Q, \quad ATC = TC/Q$

Exercise 1: Types of Costs

Fill in the following table:

Q	VC	TC	AFC	AVC	ATC	MC
0		50	N/A	N/A	N/A	N/A
1	10			10	60	10
2	30	80				
3			16.67	20	36.67	30
4	100	150	12.50		37.50	
5	150			30		
6	210	260	8.33	35	43.33	60

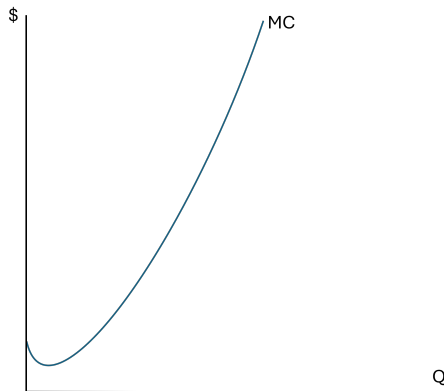
Exercise 1: Types of Costs

Solution:

Q	VC	TC	AFC	AVC	ATC	MC
0	0	50	N/A	N/A	N/A	N/A
1	10	60	50	10	60	10
2	30	80	25	15	40	20
3	60	110	16.67	20	36.67	30
4	100	150	12.50	25	37.50	40
5	150	200	10	30	40	50
6	210	260	8.33	35	43.33	60

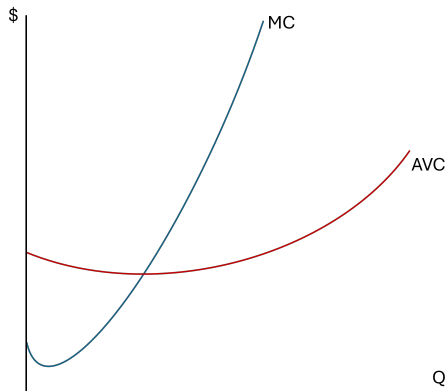
Cost Curves

- **Decreasing returns to scale:**
The amount of input required to produce one more unit of output increases with quantity of output.
 \Rightarrow MC is upward-sloping.



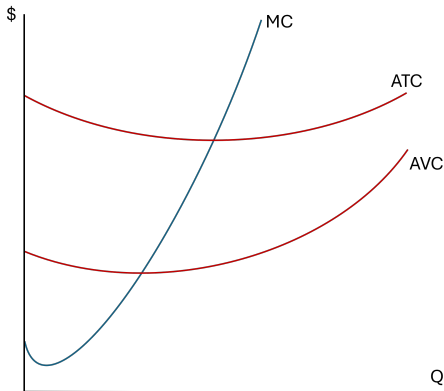
Cost Curves

- **Decreasing returns to scale:**
The amount of input required to produce one more unit of output increases with quantity of output.
⇒ MC is upward-sloping.
- AVC decreases when greater than MC and increases when less than MC.
⇒ MC crosses AVC at the minimum.



Cost Curves

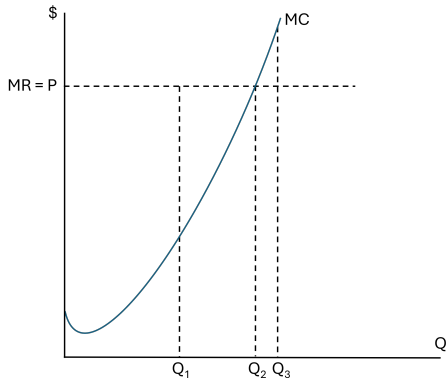
- **Decreasing returns to scale:**
The amount of input required to produce one more unit of output increases with quantity of output.
⇒ MC is upward-sloping.
- AVC decreases when greater than MC and increases when less than MC.
⇒ MC crosses AVC at the minimum.
- ATC adds average fixed cost to AVC
⇒ Behaves in the same way as AVC.



Profit Maximization

Suppose the market is perfectly competitive, and the equilibrium price is P .

Which quantity should the firm produce?

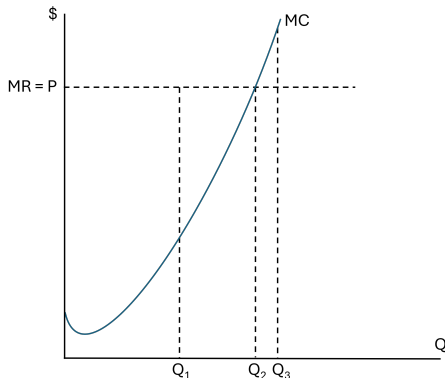


Profit Maximization

Suppose the market is perfectly competitive, and the equilibrium price is P .

Which quantity should the firm produce?

- Choosing Q_1 leaves money on the table: could produce more and still make positive marginal profits.
- Choosing Q_3 makes negative marginal profits on the final units.
- At Q_2 no improvement can be made.
- **Firms maximize profit by setting $MR = MC$.**



Exercise 2: Cost Calculation

Suppose this firm is a price-taker of market price P . Use the pictured cost curves to calculate

- 1 Total Revenue
- 2 Total Cost
- 3 Variable Cost
- 4 Fixed Cost
- 5 Profit

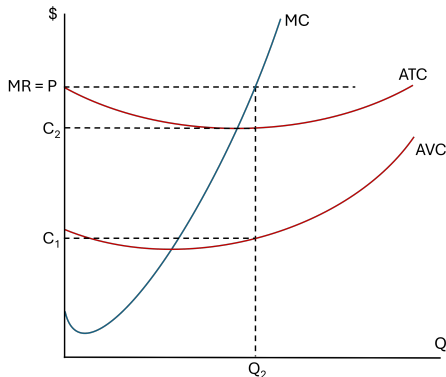
Hint:

$$TC = VC + FC$$

$$AFC = FC/Q$$

$$AVC = VC/Q$$

$$ATC = TC/Q$$

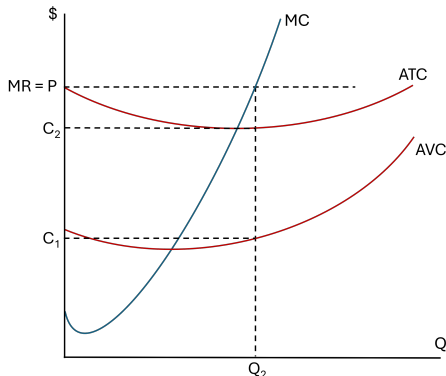


Exercise 2: Cost Calculation

Solution:

The firm maximizes profit by producing Q_2 , where $MR = MC$.

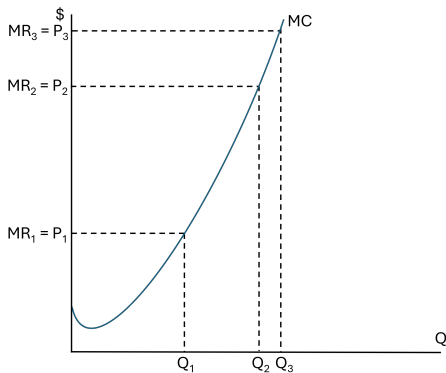
- ① $TR = P \times Q_2$
- ② $TC = ATC \times Q = C_2 \times Q_2$
- ③ $VC = AVC \times Q = C_1 \times Q_2$
- ④ $FC = TC - VC = (C_2 - C_1) \times Q_2$
- ⑤ $\Pi = TR - TC = (P - C_2) \times Q_2$



The Supply Curve

- Firms maximize profit by setting $MR = MC$.

→ The marginal cost curve describes the relationship between price and quantity supplied.



The Supply Curve

- Firms maximize profit by setting $MR = MC$.

→ The marginal cost curve describes the relationship between price and quantity supplied.

- For a competitive market (where $P = MR$), the MC curve *is the firm's supply curve*!

