

# Theory of Cost

# COSTS OF PRODUCTION

- In production a **cost** is the value of money that has been used up to produce something or deliver a service, and hence is not available for use anymore. In business, the cost may be one of acquisition, in which case the amount of money expended to acquire it is counted as cost.
- Cost function- It is the functional relation between its costs and outputs.
- Cost function –i) short run cost  
ii) Long run cost

# Short-run cost

1. Total Fixed Cost (TFC)
2. Total Variable Cost (TVC)
3. Total Cost ( $TC = TVC + TFC$ )
4. Average Fixed Cost ( $AFC = TFC/Q$ )
5. Average Variable Cost ( $AVC = TVC/Q$ )
6. Average Total Cost ( $AC = AFC + AVC$ )
7. Marginal Cost ( $MC = \Delta AVC / \Delta Q$ )

# Short Run Analysis

- ***Total fixed cost (TFC)*** is more commonly referred to as "sunk cost" or "overhead cost."
  - Examples: include the payment or rent for land, buildings and machinery.
  - The fixed cost is independent of the level of output produced.
  - Graphically, depicted as a horizontal line

# Short Run Analysis

- ***Total variable cost (TVC)*** refers to the cost that changes as the amount of output produced is changed.
  - Examples - purchases of raw materials, payments to workers, electricity bills, fuel and power costs.
  - Total variable cost increases as the amount of output increases.
    - If no output is produced, then total variable cost is zero;
    - the larger the output, the greater the total variable cost.

# Short Run Analysis

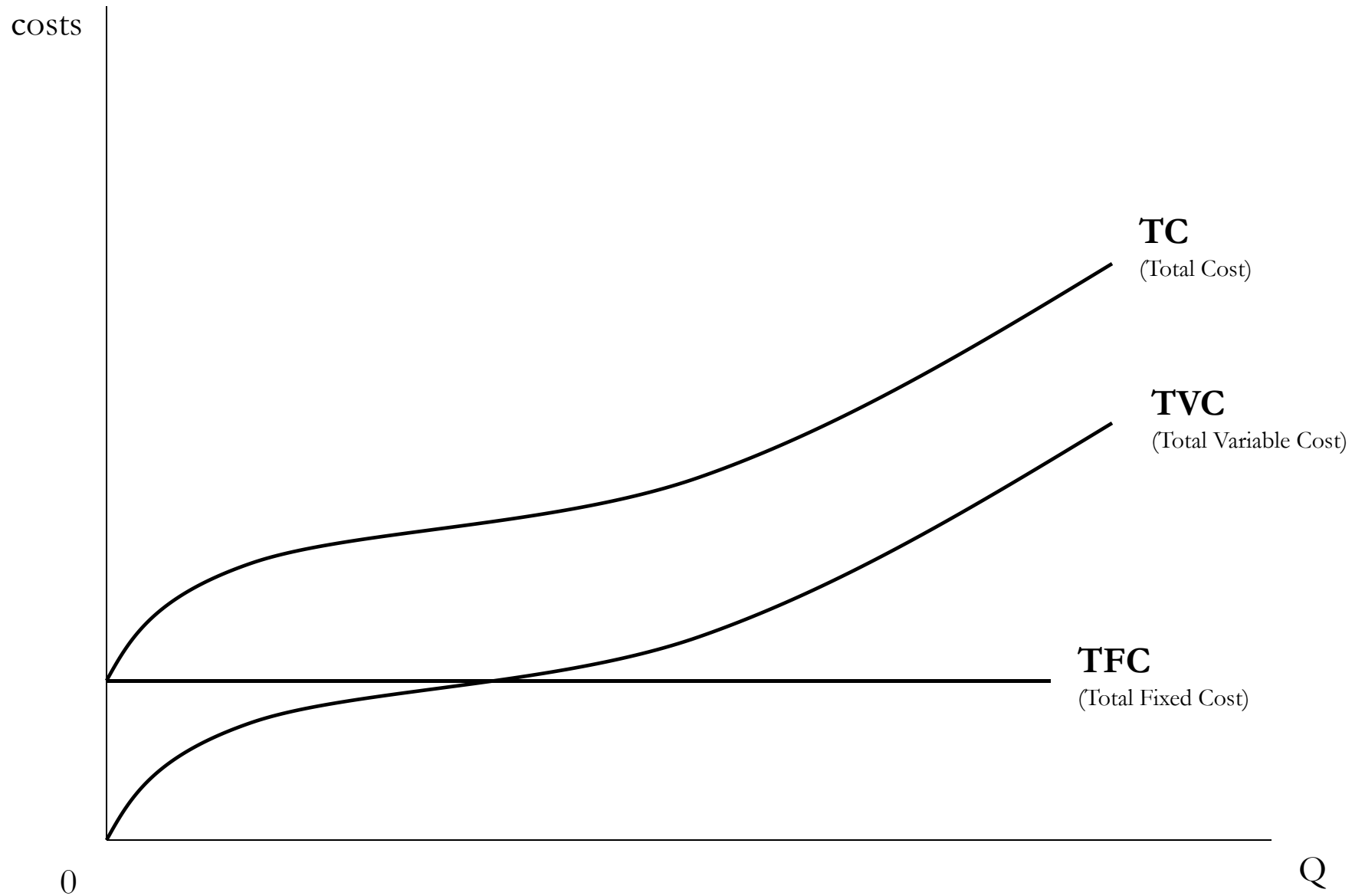
- ***Total cost*** (TC) is the sum of total fixed cost and total variable cost

$$TC = TFC + TVC$$

As the level of output increases, total cost of the firm also increases.

# Total Costs of Production

Output	Total Fixed Cost	Total Variable Cost	Total Cost	Marginal Cost	Average Cost
Q	TFC	TVC	TC	MC	AC
0	100	0	100	-	-
1	100	30	130	30	130
2	100	50	150	20	75
3	100	60	160	10	53.3
4	100	65	165	5	41.25
5	100	75	175	10	35
6	100	95	195	20	32.5
7	100	125	225	30	32.14
8	100	165	265	40	33.12
9	100	215	315	50	35
10	100	275	375	60	37.5



“TOTAL” COST CURVES



# Average Fixed Cost

(Q)	(TFC)	(AFC)
0	100	-
1	100	100
2	100	50
3	100	33.3
4	100	25
5	100	20
6	100	16.6
7	100	14.2
8	100	12.5
9	100	11.1
10	100	10

AFC is per unit Fixed cost

With the increase in output, AFC goes on diminishing.

$$\text{AFC} = \text{TFC} / \text{Q}$$

cost

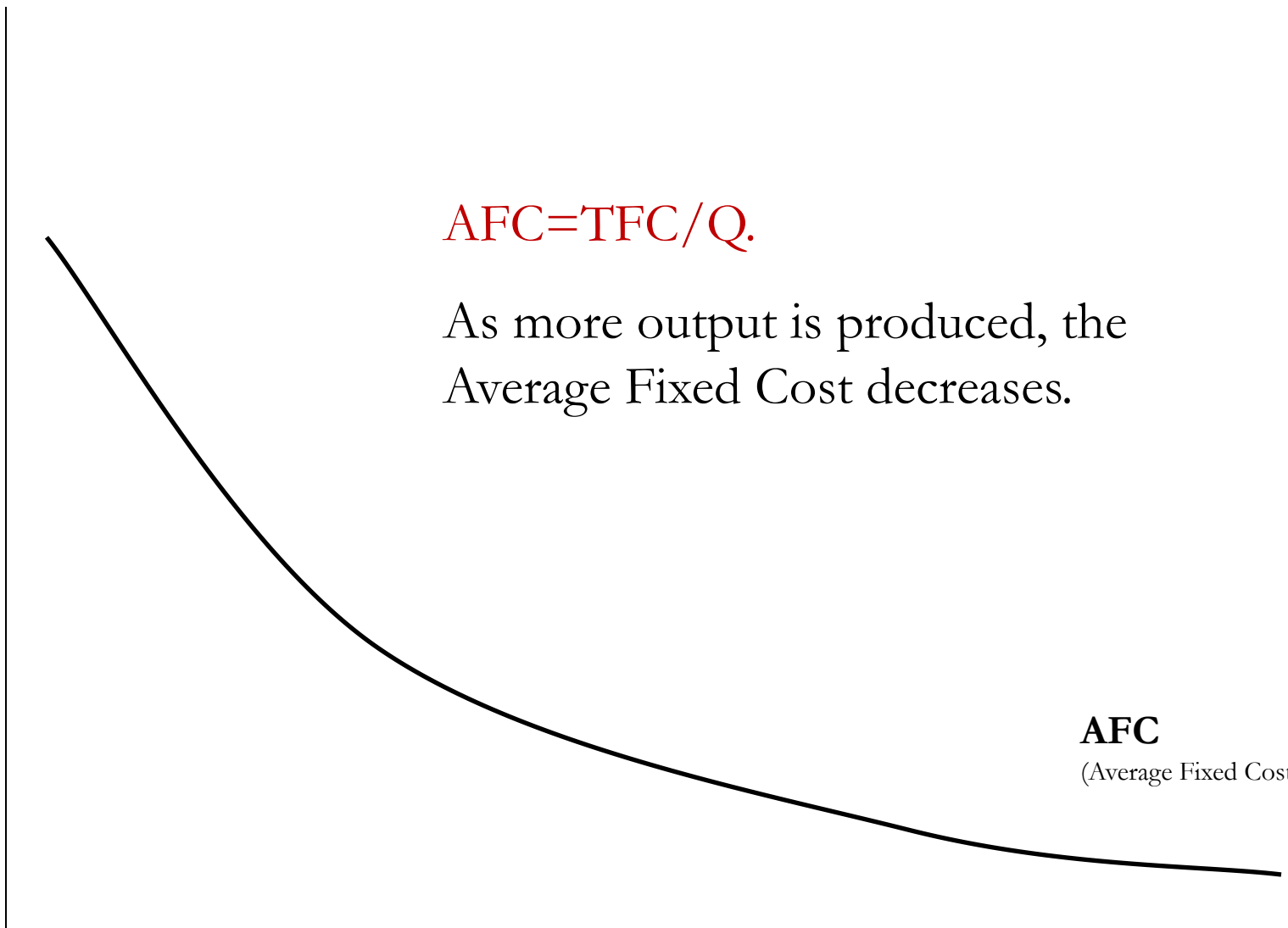
$$AFC = TFC / Q.$$

As more output is produced, the  
Average Fixed Cost decreases.

**AFC**  
(Average Fixed Cost)

0

Q



# Average Variable cost(AVC)

Total Product (Q)	Total Variable Cost (TVC)	Average Variable Cost (AVC)
0	0	0
1	30	30.0
2	50	25.0
3	60	20.0
4	65	16.3
5	75	15.0
6	95	15.8
7	125	17.9
8	165	20.6
9	215	23.9
10	275	27.5

AVC is per unit variable cost

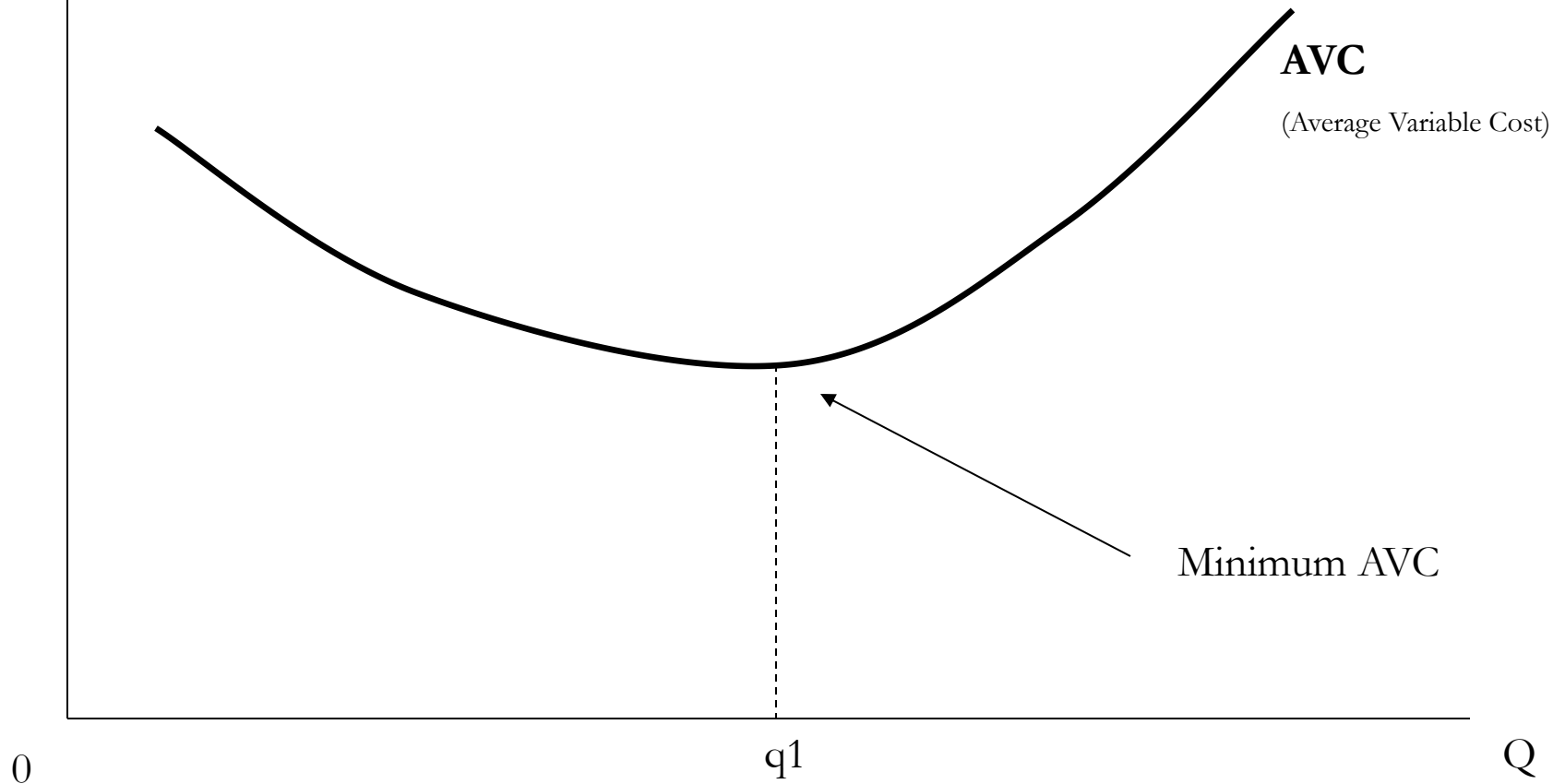
With the increase in output, AVC initially has been falling than it begins to rise.

$$AVC = TVC/Q$$

It assumes the shape of 'U'- letter.

cost

The Average Variable Cost is U shaped. First it decreases, reaches a minimum and then increases.



# Average cost

(Q)	(TC)	(AC)
0	100	-
1	130	130.00
2	150	75.00
3	160	53.33
4	165	41.25
5	175	35.00
6	195	32.50
7	225	32.14
8	265	33.13
9	315	35.00
10	375	37.50

The Average cost is the total per unit cost.

$$AC = TC/Q = AFC + AVC$$

It also assumes the shape of 'U'- letter.

Cost

It is also U-shaped. First it decreases, reaches a minimum and then increases.

**SAC(Shortrun  
avg cost)**

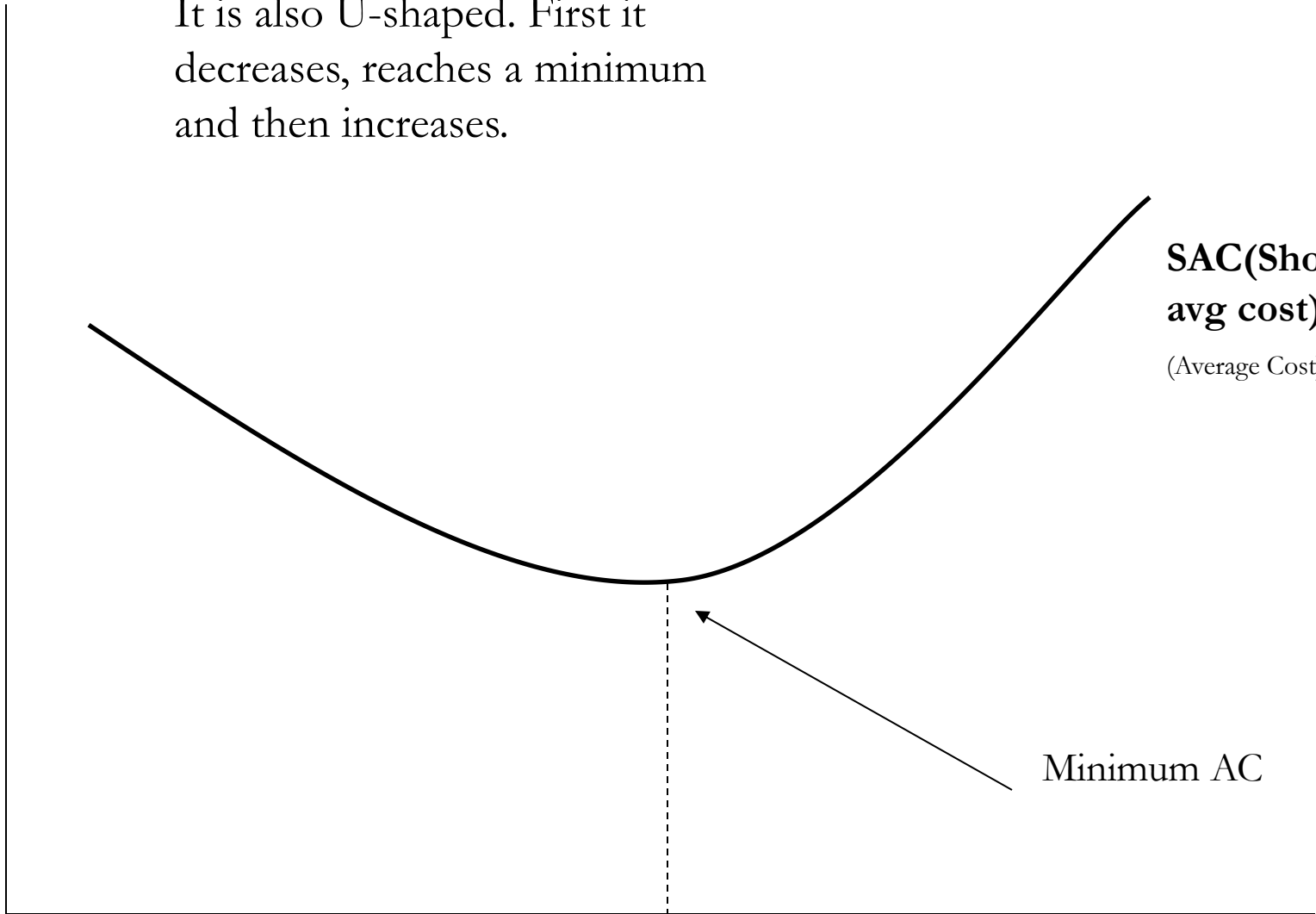
(Average Cost)

Minimum AC

0

q1

Q



# Marginal Cost

Total Product (Q)	Total Cost (TC)	Marginal Cost (MC)
0	100	-
1	130	30
2	150	20
3	160	10
4	165	5
5	175	10
6	195	20
7	225	30
8	265	40
9	315	50
10	375	60

Marginal Cost is the addition to the total cost when output increases by one unit.

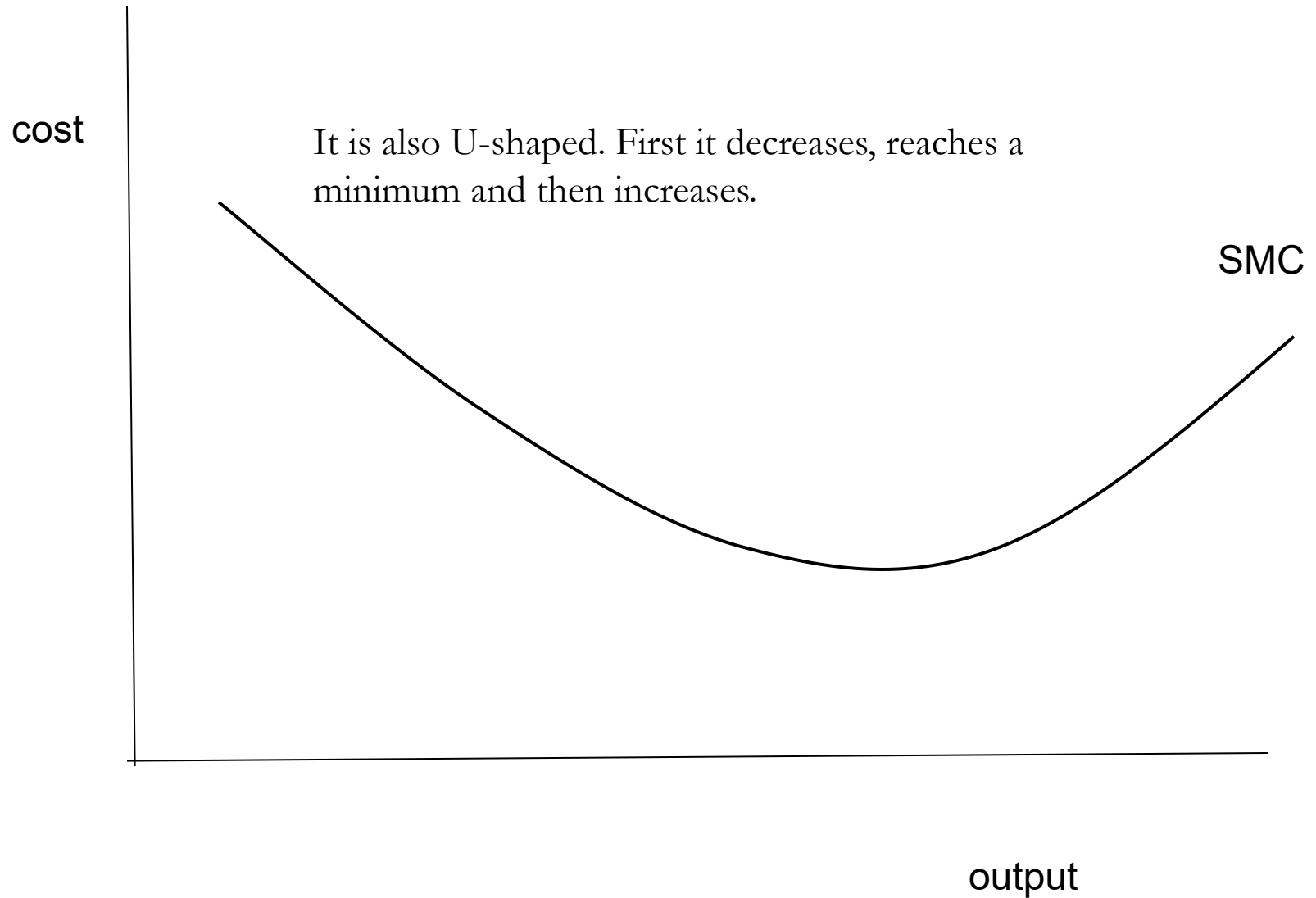
MC curve is also “U” shape.

$$\text{Marginal Cost (MC)} = \frac{\Delta TC}{\Delta Q}$$

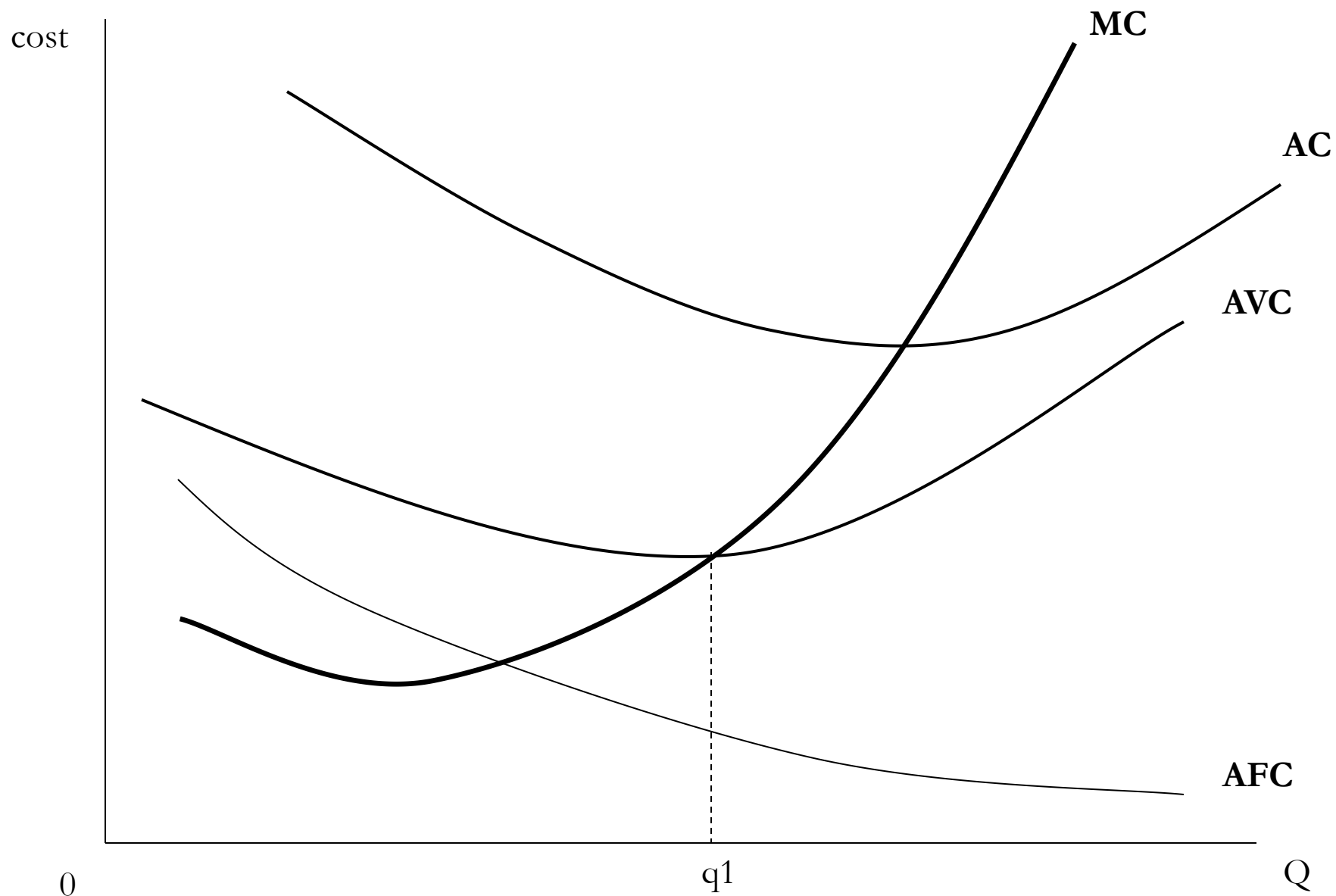
Where

$\Delta$  = Change  
TC = Total Cost  
Q = Quantity

# Marginal cost curve



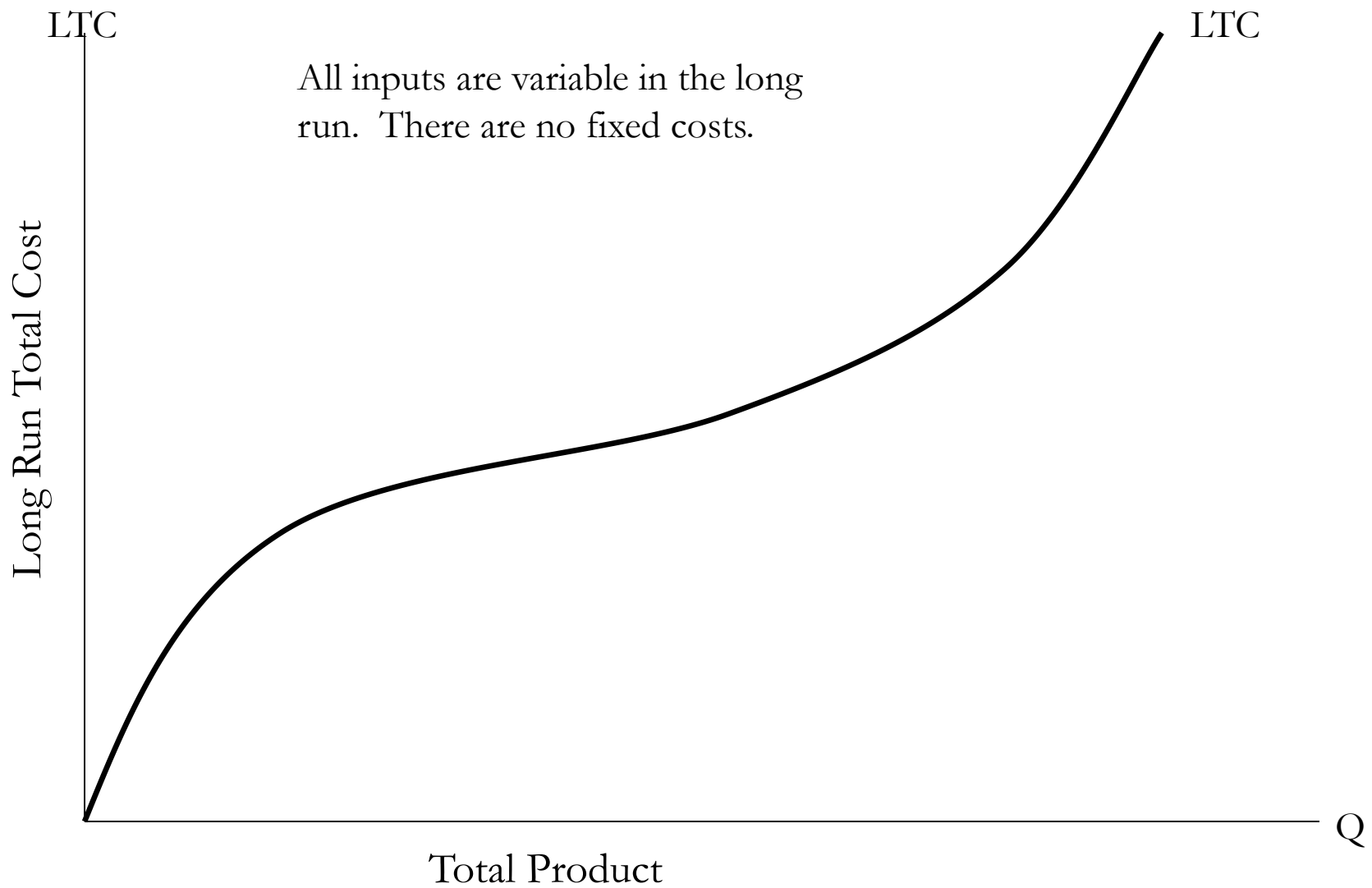




The “PER UNIT” COST CURVES

# Long run cost

- Longrun is the time period in which all factors are variable. The firm has sufficient time to adjust its use of all input to produce output in least costly way.
- Longrun cost is the minimum cost at which each level of output can be produced  
Longrun Cost- i) LTC  
                  ii) LAC  
                  iii) LMC

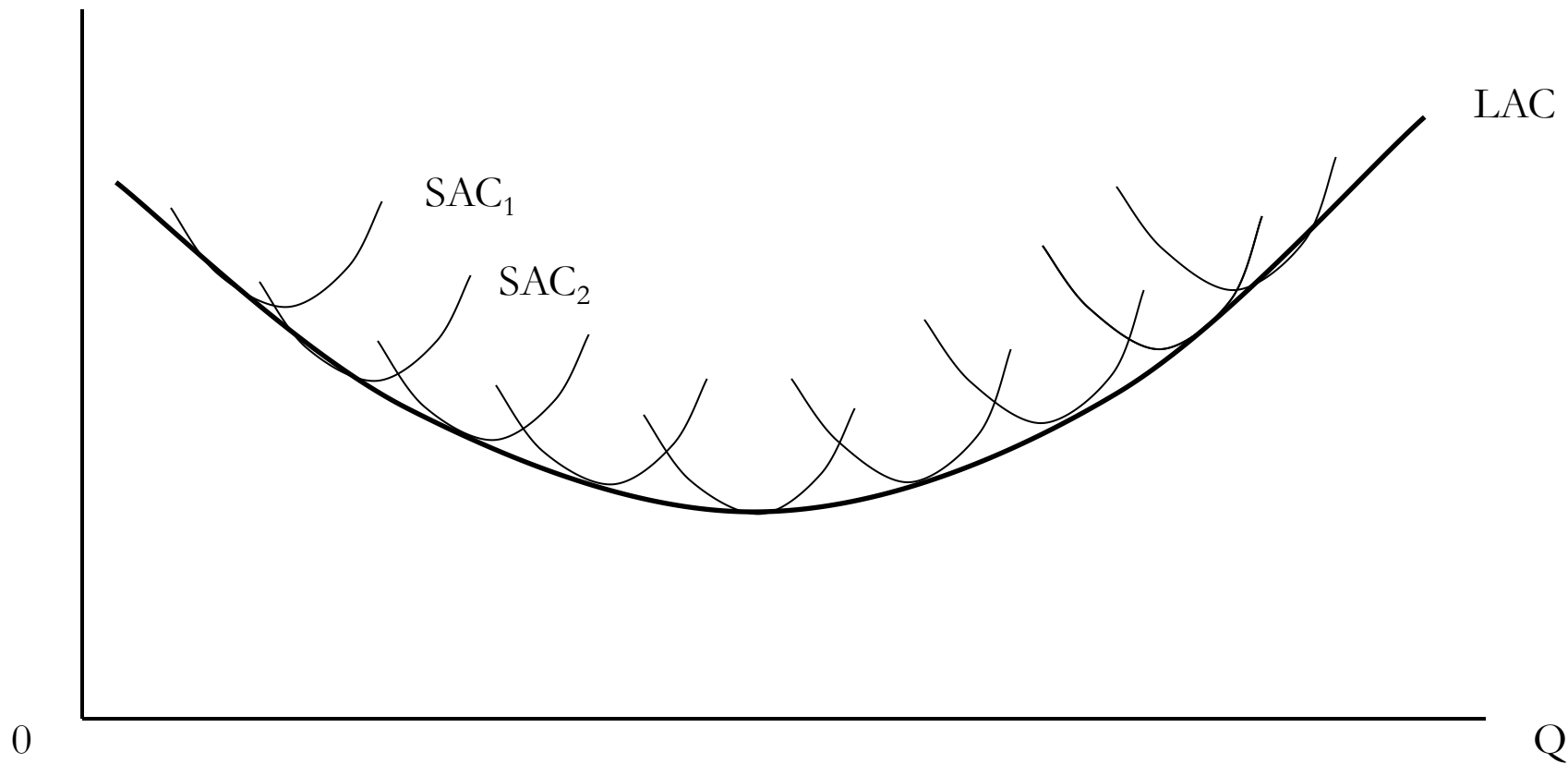


**LONG-RUN TOTAL COST CURVE**

# The LAC

- The LAC curve is an envelop curve of all possible plant sizes. Also known as “planning curve”
- It traces the lowest average cost of producing each level of output.
- It is U-shaped because of
  - Economies of Scale
  - Diseconomies of Scale

COST



**LONG-RUN AVERAGE COST CURVE**

COST

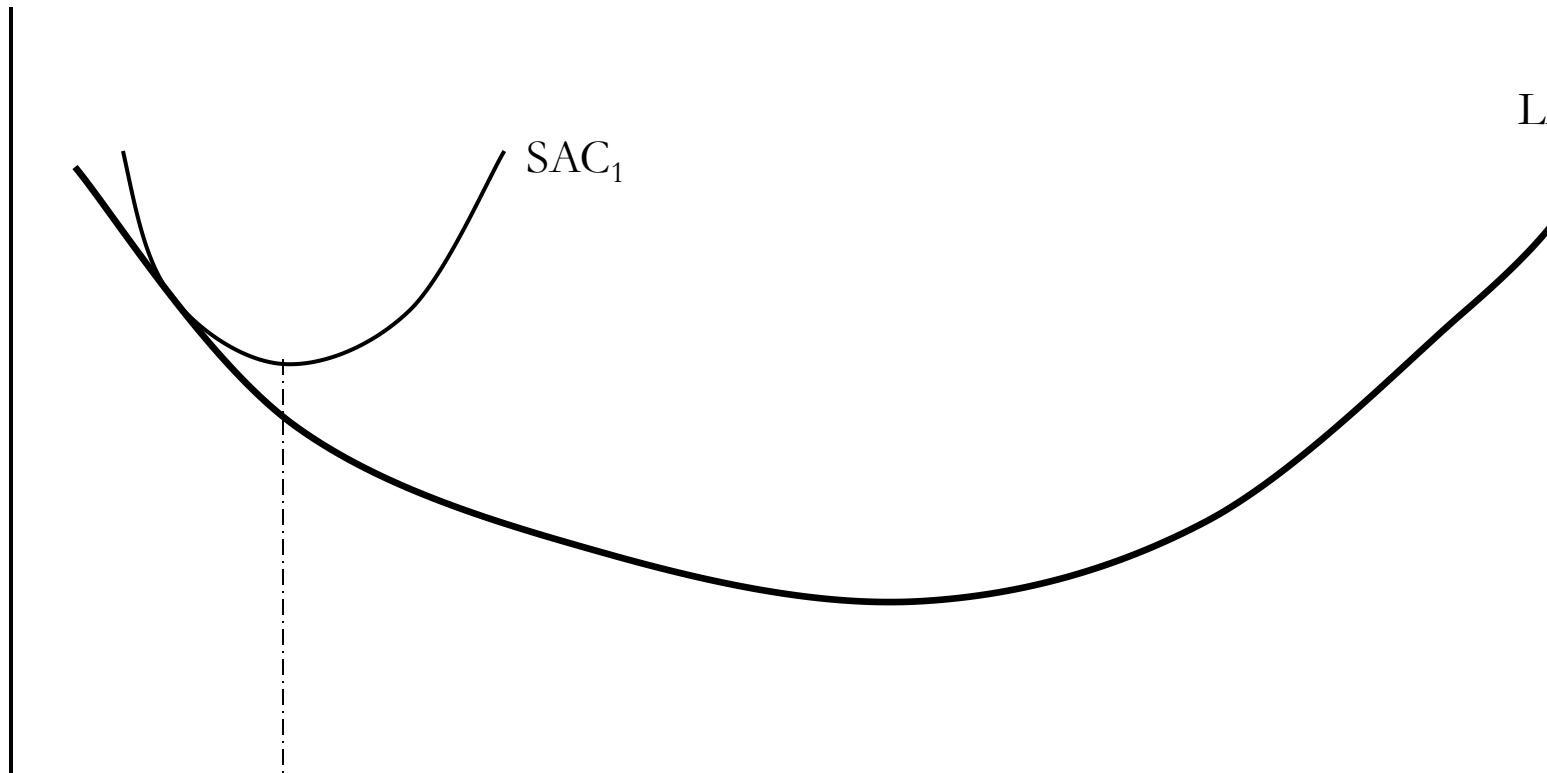
LAC

SAC<sub>1</sub>

0

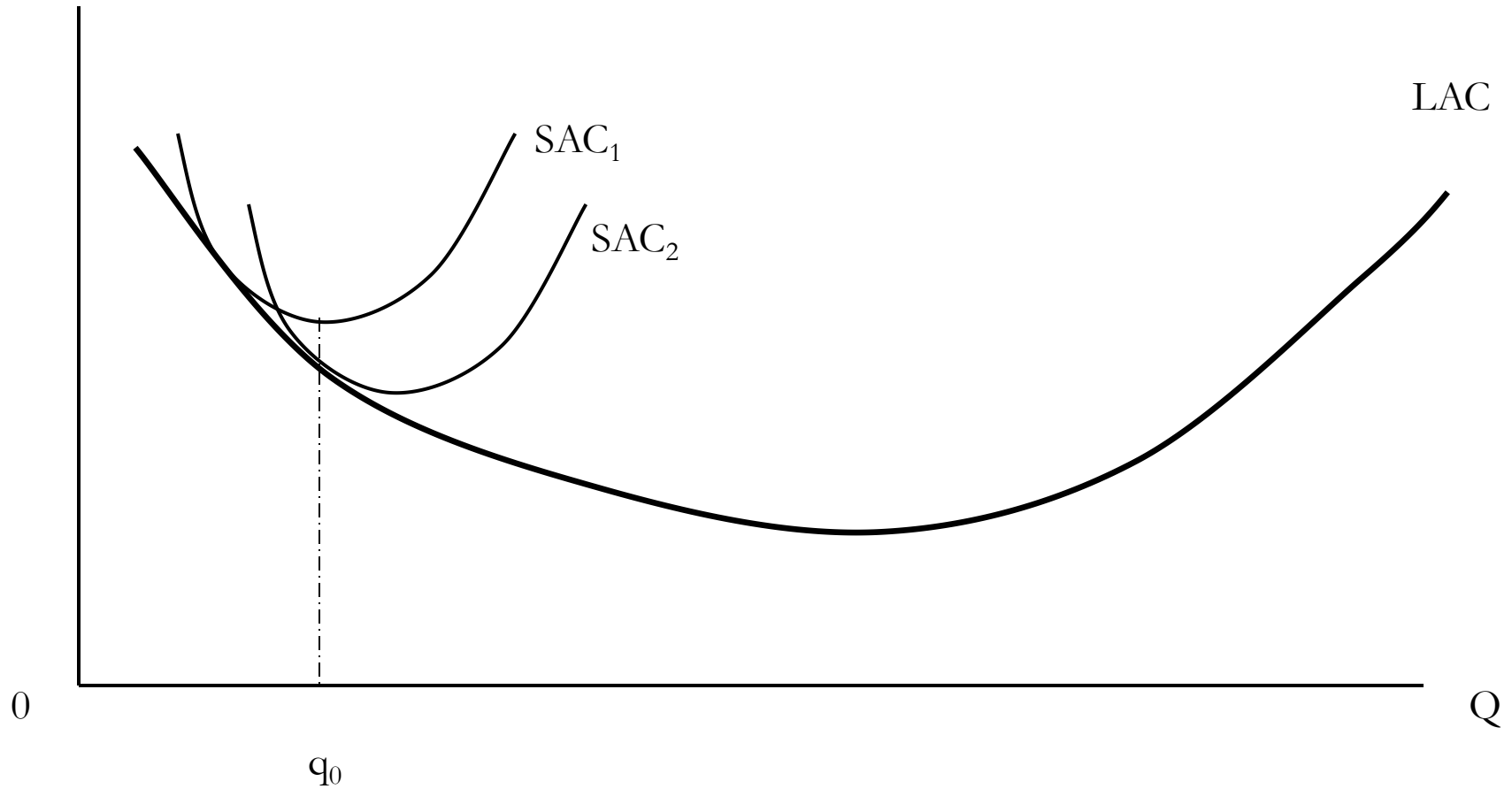
Q

$q_0$



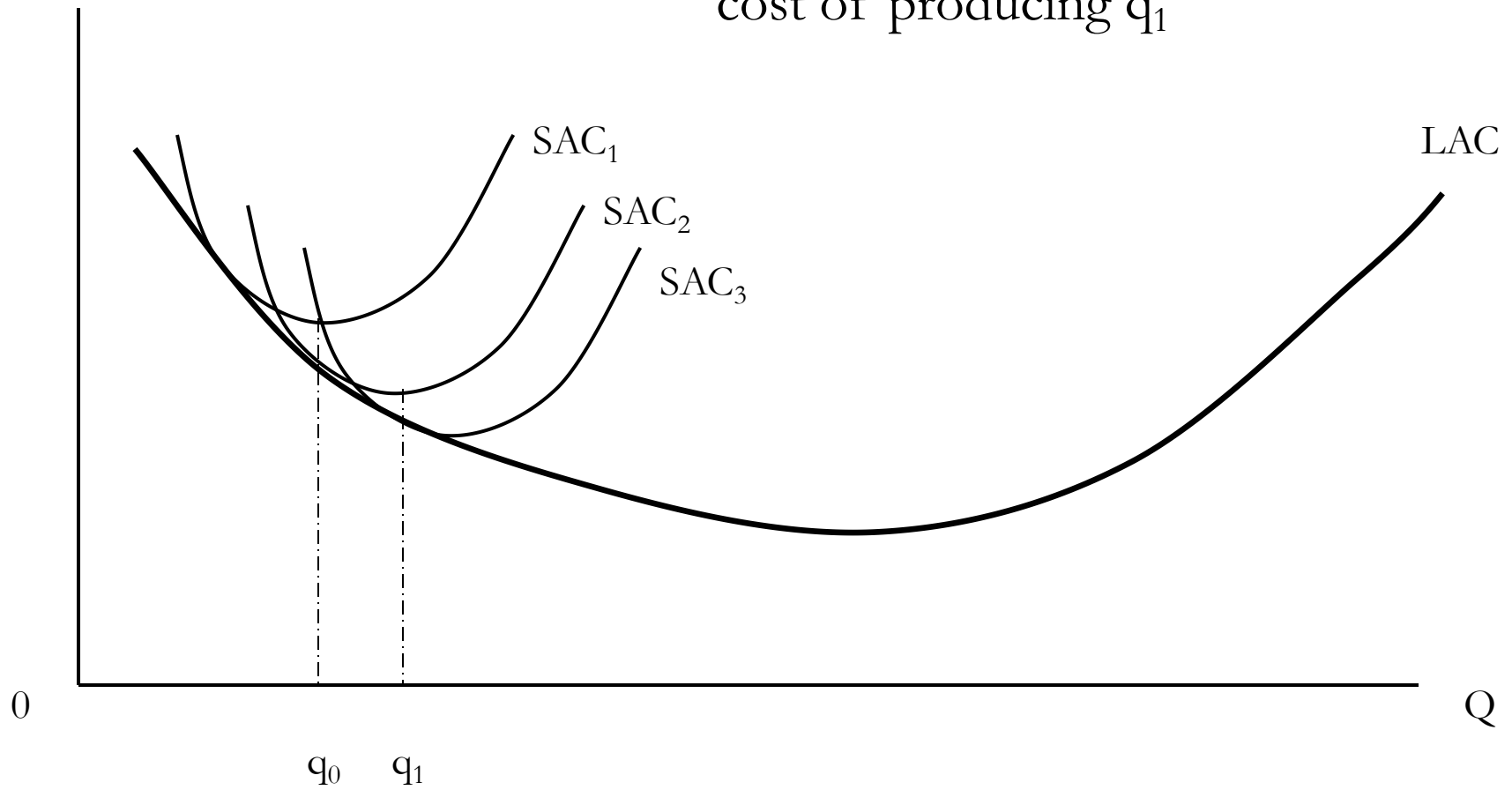
Building a larger sized plant (size 2)  
will result in a lower average cost of  
producing  $q_0$

COST



Likewise, a larger sized plant (size 3) will result to a lower average cost of producing  $q_1$

COST

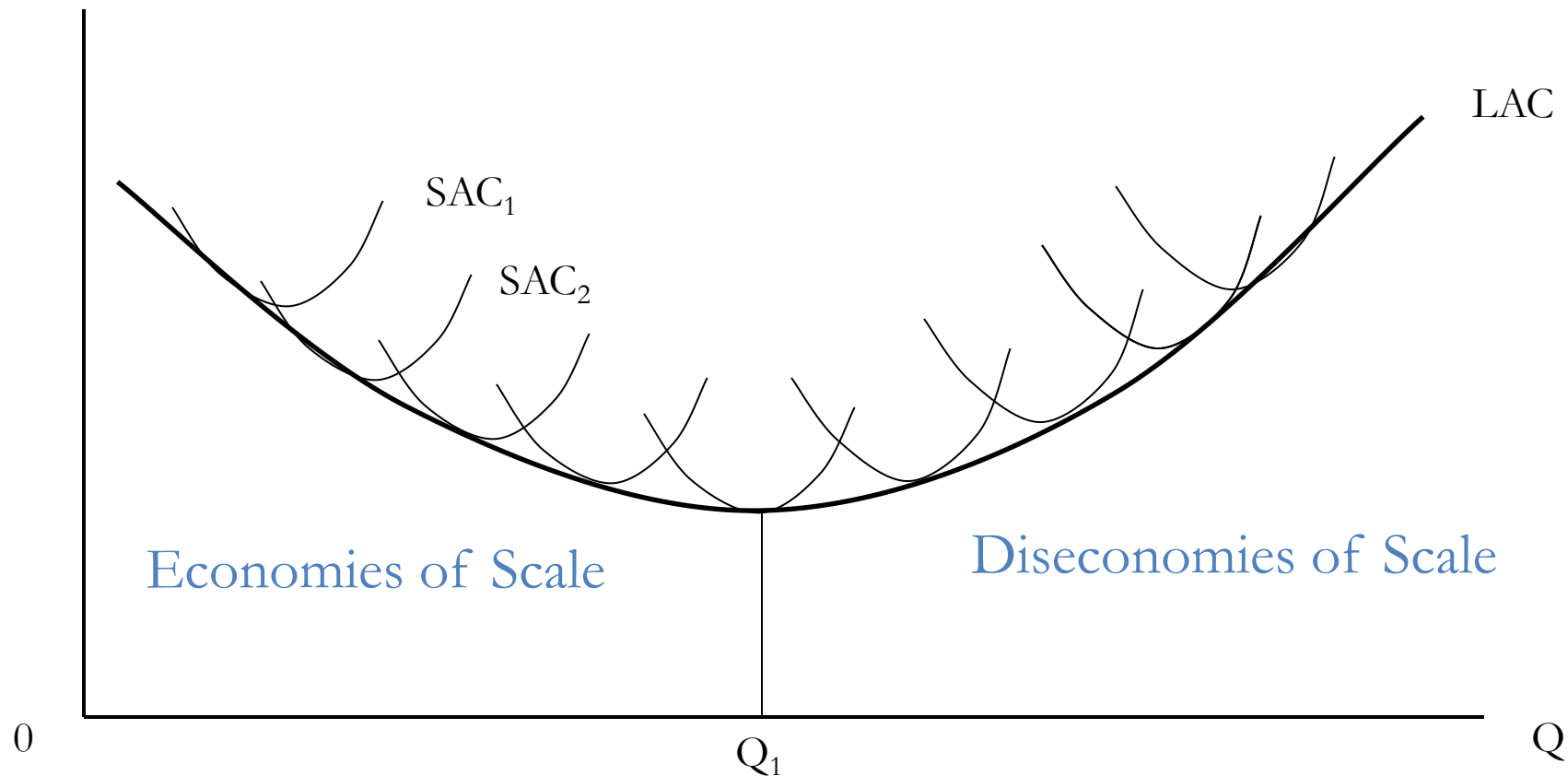




# Economies and Diseconomies of Scale

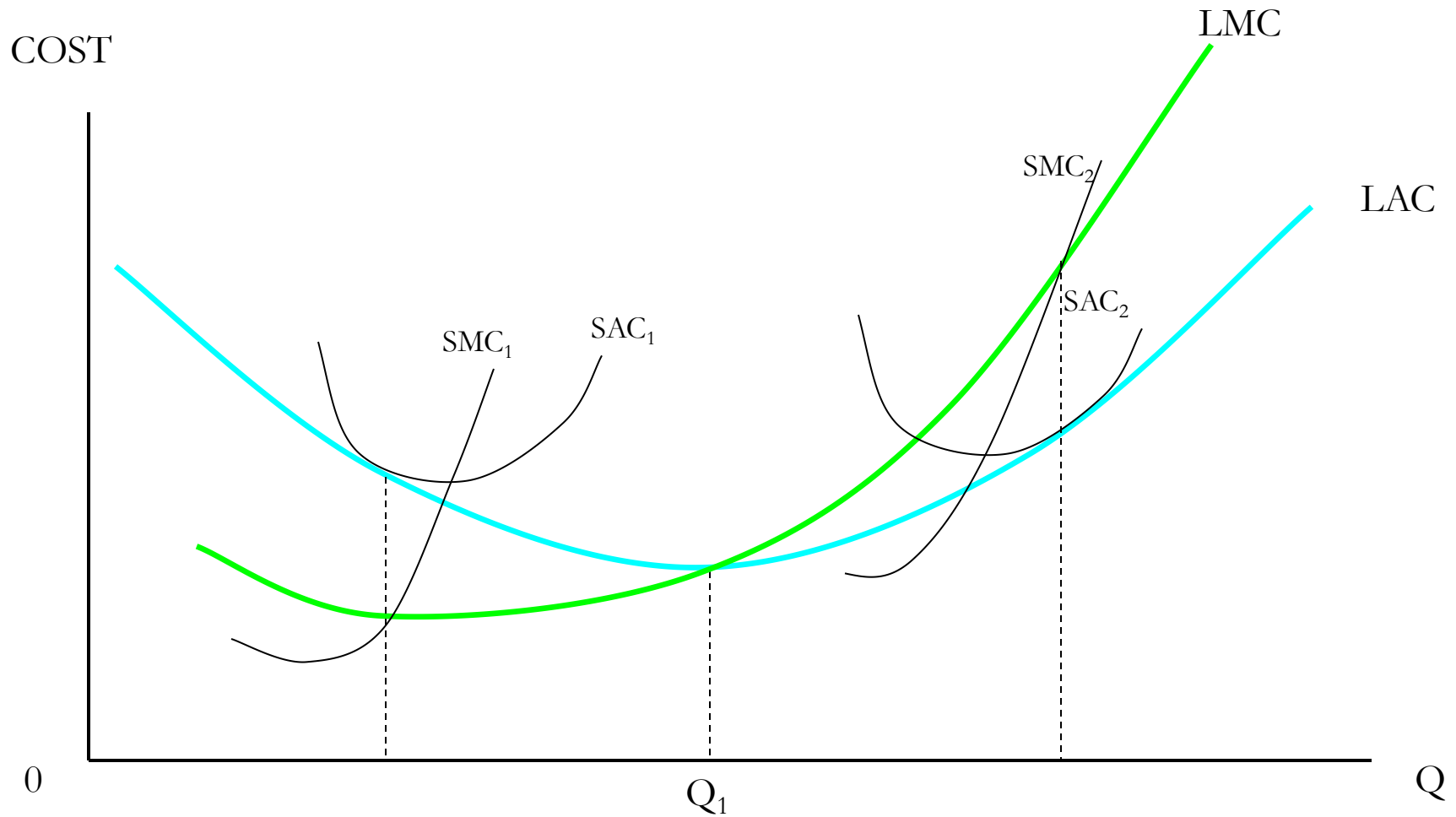
- Economies of Scale- long run average cost decreases as output increases.
  - Technological factors
  - Specialization
- Diseconomies of Scale: - long run average cost increases as output increases.
  - Problems with management – becomes costly, unwieldy

COST



**LONG-RUN AVERAGE COST CURVE**

# LONG-RUN AVERAGE and MARGINAL COST CURVES



# LAC and LMC

- **Long-run Average Cost (LAC) curve**
  - is U-shaped.
  - the envelope of all the short-run average cost curves;
  - driven by economies and diseconomies of size.
- **Long-run Marginal Cost (LMC) curve**
  - Also U-shaped;
  - intersects LAC at LAC's minimum point.

**End**