COST

Managerial Economics & Business Strategy

Cost Analysis

- Types of Costs
  - Short-Run
    - Fixed costs (FC)
    - Sunk costs
    - Short-run variable costs (VC)
    - Short-run total costs (TC)
  - Long-Run
    - All costs are variable
    - No fixed costs

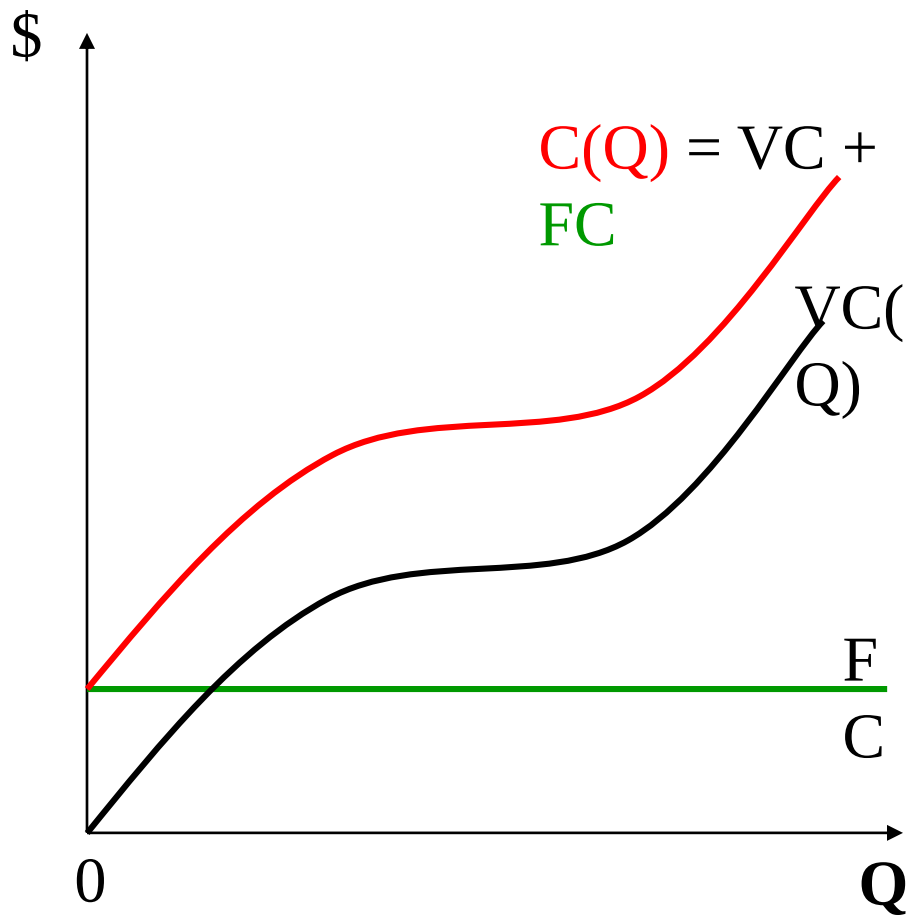
Total and Variable Costs

C(Q): Minimum total cost of producing alternative levels of output:

$$C(Q) = VC(Q) + FC$$

VC(Q): Costs that vary with output.

FC: Costs that do not vary with output.

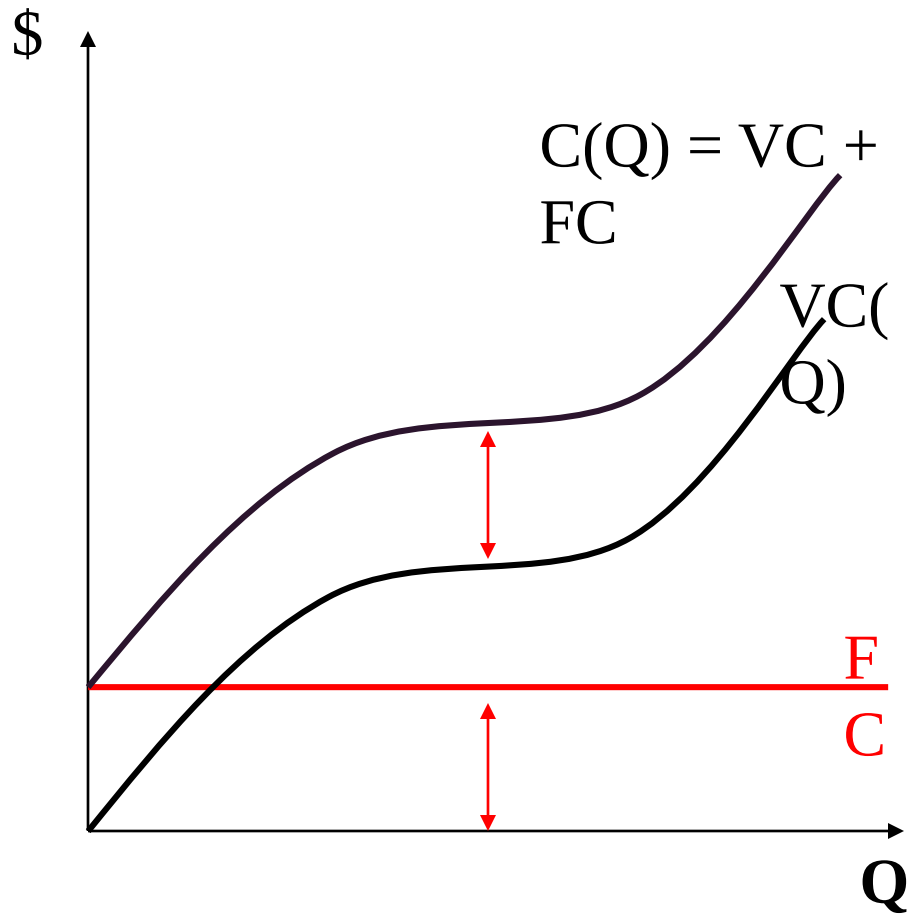


Fixed and Sunk Costs

FC: Costs that do not change as output changes.

Sunk Cost: A cost that is forever lost after it has been paid.

Decision makers should ignore sunk costs to maximize profit or minimize losses



Some Definitions

Average Total Cost

ATC = AVC + AFC

ATC = C(Q)/Q

Average Variable Cost

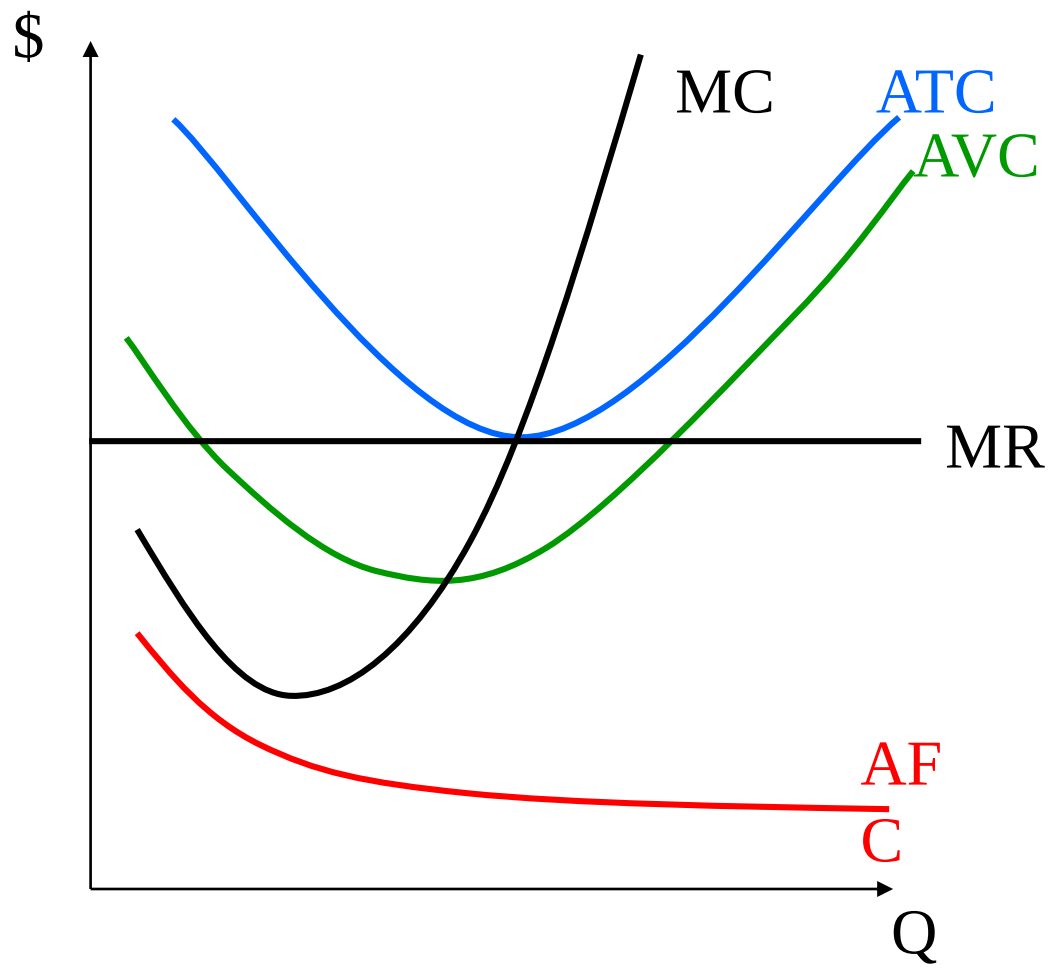
AVC = VC(Q)/Q

Average Fixed Cost

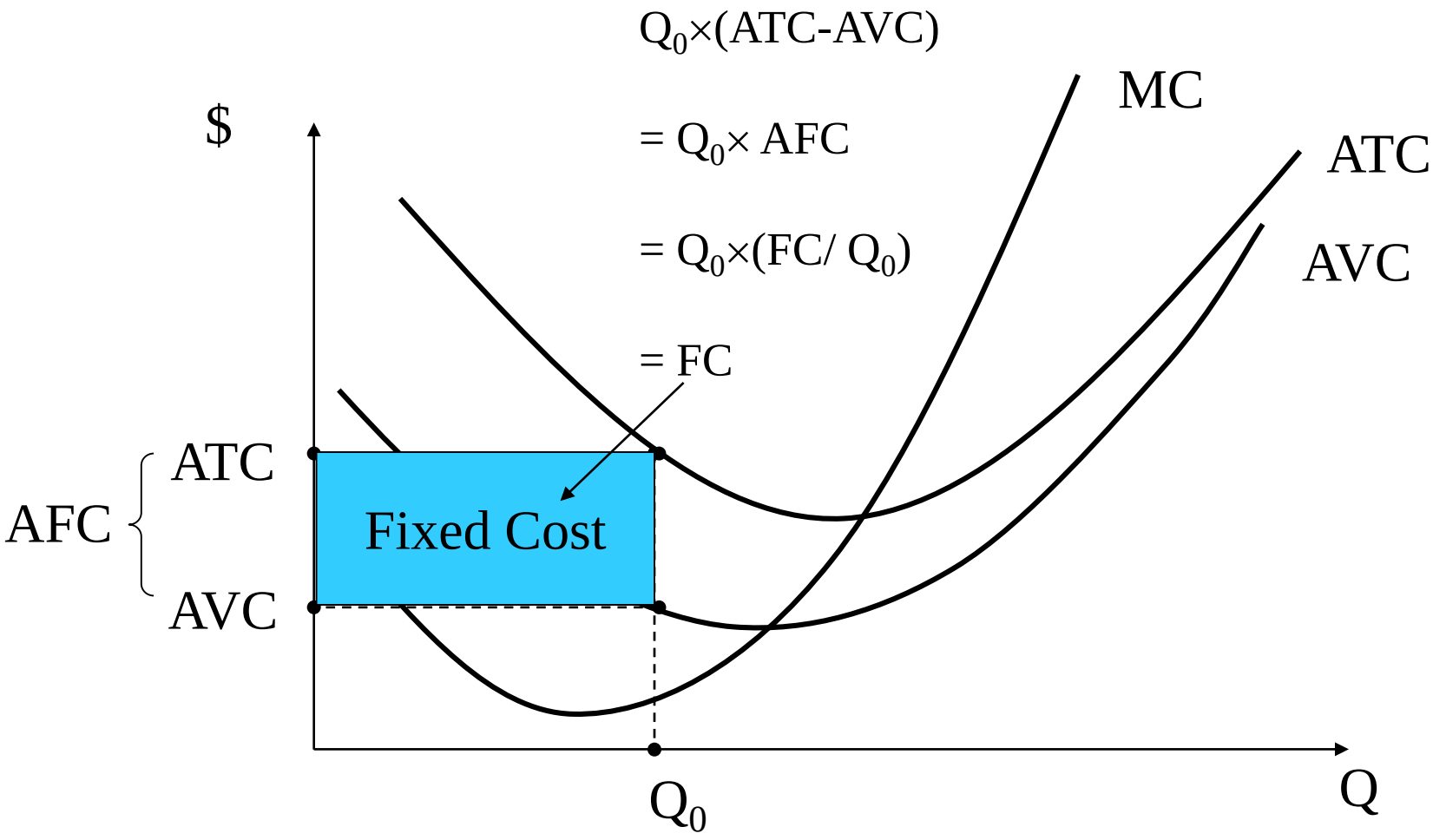
AFC = FC/Q

Marginal Cost

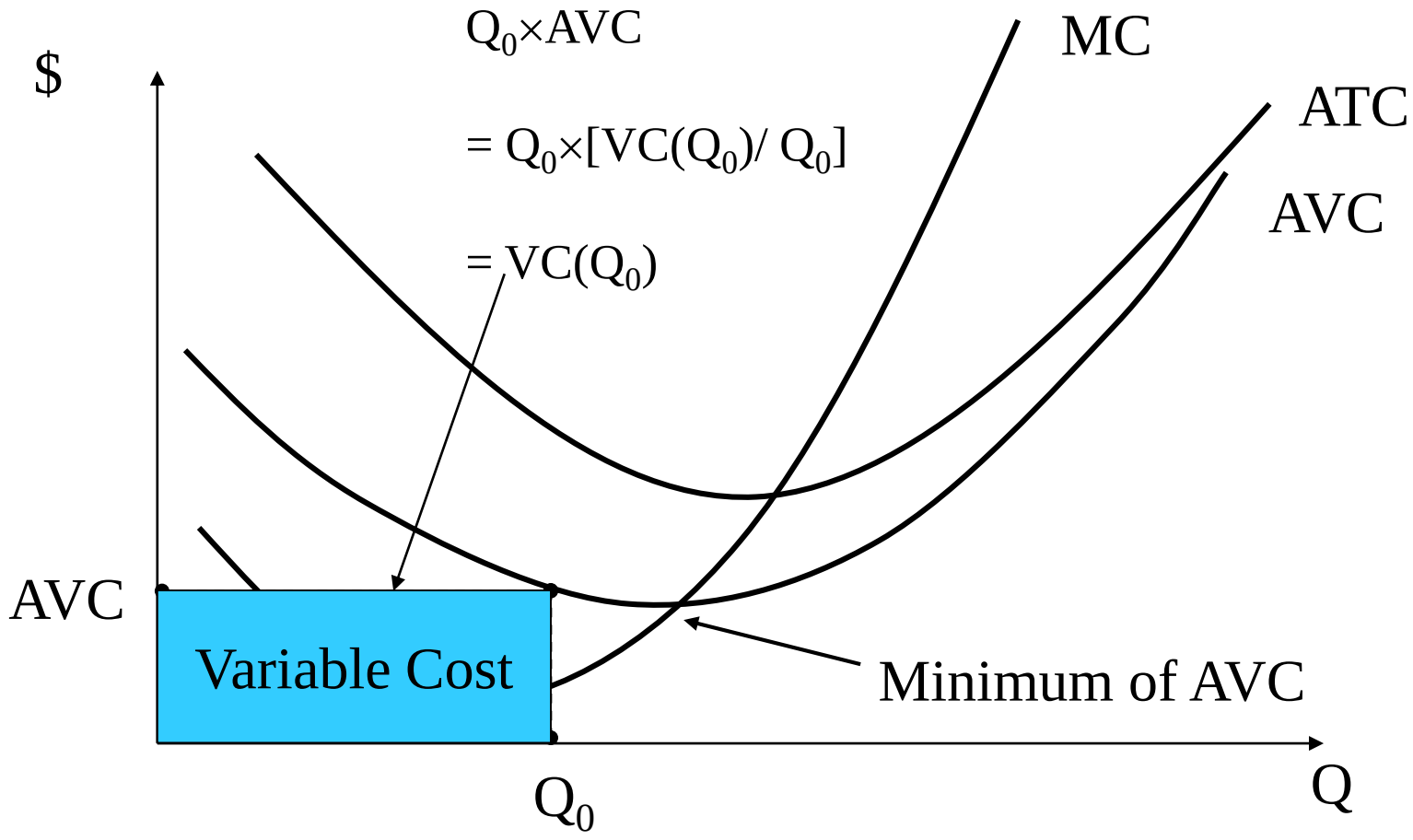
MC = ΔC/ΔQ



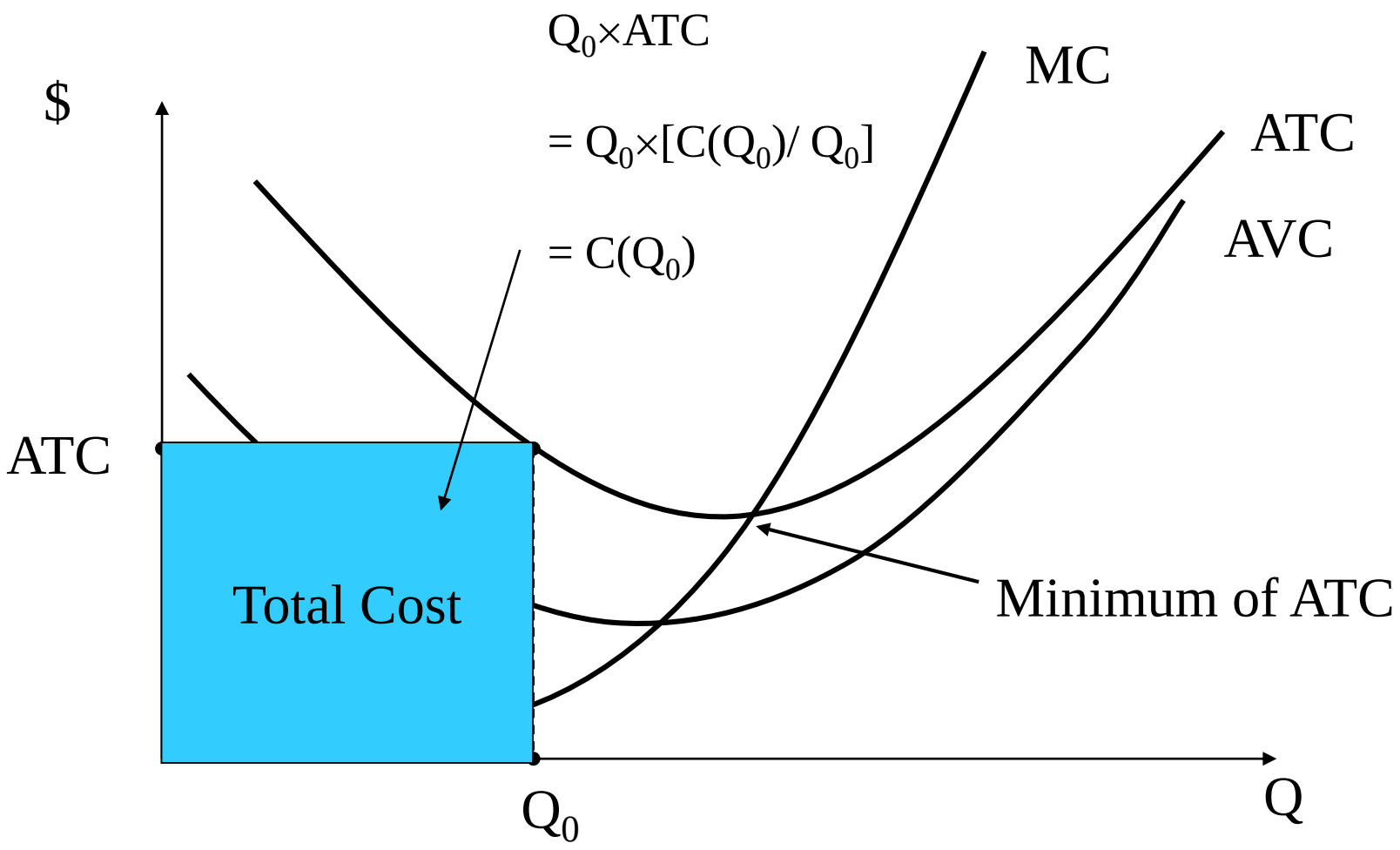
Fixed Cost


$Q_0 \times (ATC-AVC)$
$= Q_0 \times AFC$
$= Q_0 \times (FC/ Q_0)$
$= FC$
$
MC
ATC
AVC
ATC
AFC
AVC
Fixed Cost
Q_0
Q

Variable Cost



Total Cost


$
$Q_0 \times ATC$
$= Q_0 \times [C(Q_0)/ Q_0]$
$= C(Q_0)$
MC
ATC
AVC
ATC
Total Cost
Minimum of ATC
Q_0
Q

Cubic Cost Function

- $C(Q) = f + a\,Q + b\,Q^2 + cQ^3$
- Marginal Cost?
  - Memorize:

$$MC(Q) = a + 2bQ + 3cQ^2$$

  - Calculus:

$$dC/dQ = a + 2bQ + 3cQ^2$$

An Example

- Total Cost: $C(Q) = 10 + Q + Q^2$
- Variable cost function:

$$VC(Q) = Q + Q^2$$

- Variable cost of producing 2 units:

$$VC(2) = 2 + (2)^2 = 6$$

- Fixed costs:

$$FC = 10$$

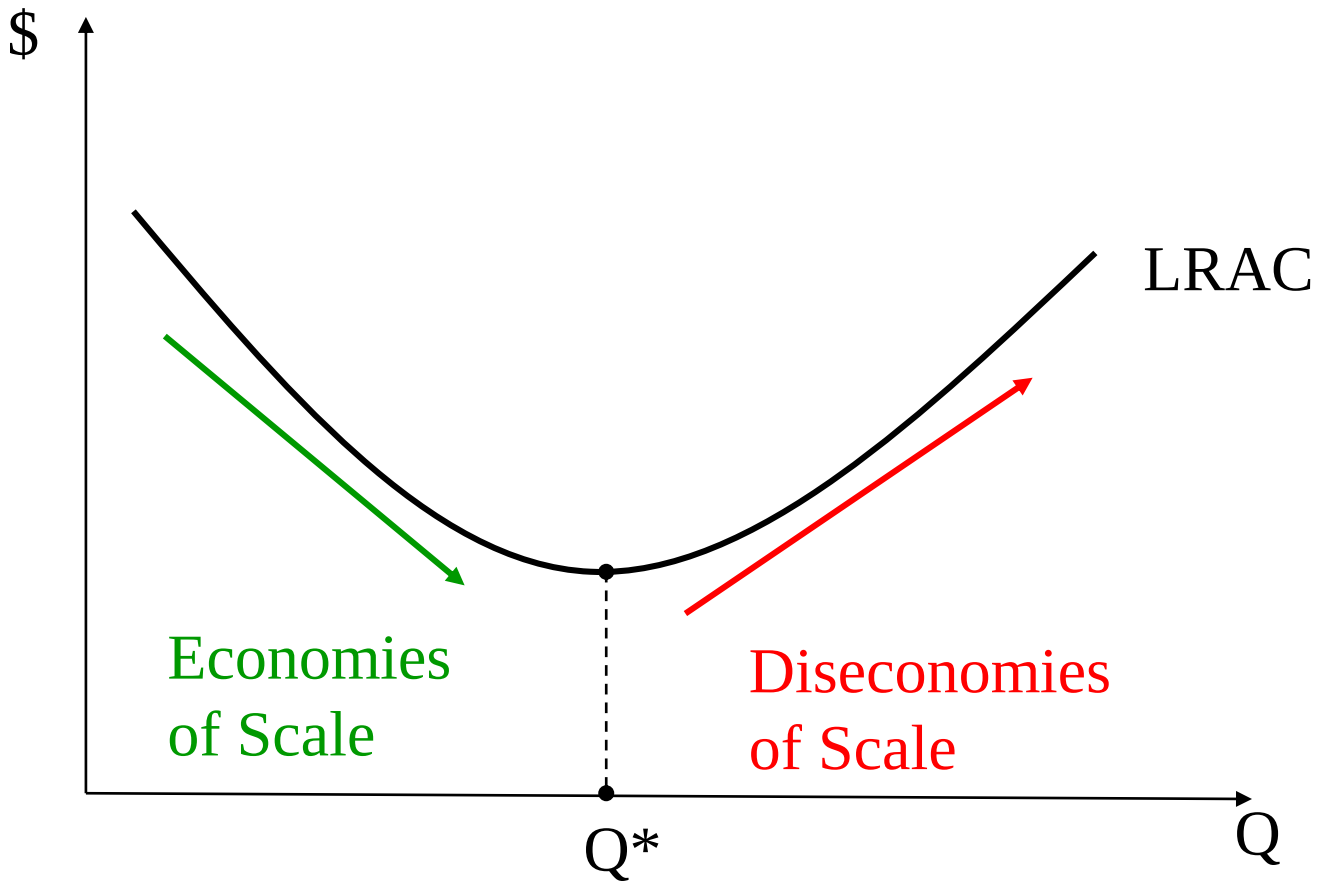
- Marginal cost function:

$$MC(Q) = 1 + 2Q$$

- Marginal cost of producing 2 units:

$$MC(2) = 1 + 2(2) = 5$$

Long-Run Average Costs



Conclusion

- To maximize profits (minimize costs) managers must use inputs such that the value of marginal of each input reflects price the firm must pay to employ the input.
- The optimal mix of inputs is achieved when the $MRTS_{KL} = (w/r)$.
- Cost functions are the foundation for helping to determine profit-maximizing behavior in future chapters.