Managerial Economics in a Global Economy, 5th Edition by Dominick Salvatore

Chapter 7

Cost Theory and Estimation

The Nature of Costs

- Explicit Costs
  - Accounting Costs
- Economic Costs
  - Implicit Costs
  - Alternative or Opportunity Costs
- Relevant Costs
  - Incremental Costs
  - Sunk Costs are Irrelevant

Short-Run Cost Functions

Total Cost = TC = f(Q)

Total Fixed Cost = TFC

Total Variable Cost = TVC

TC = TFC + TVC

Short-Run Cost Functions

Average Total Cost = ATC = TC/Q

Average Fixed Cost = AFC = TFC/Q

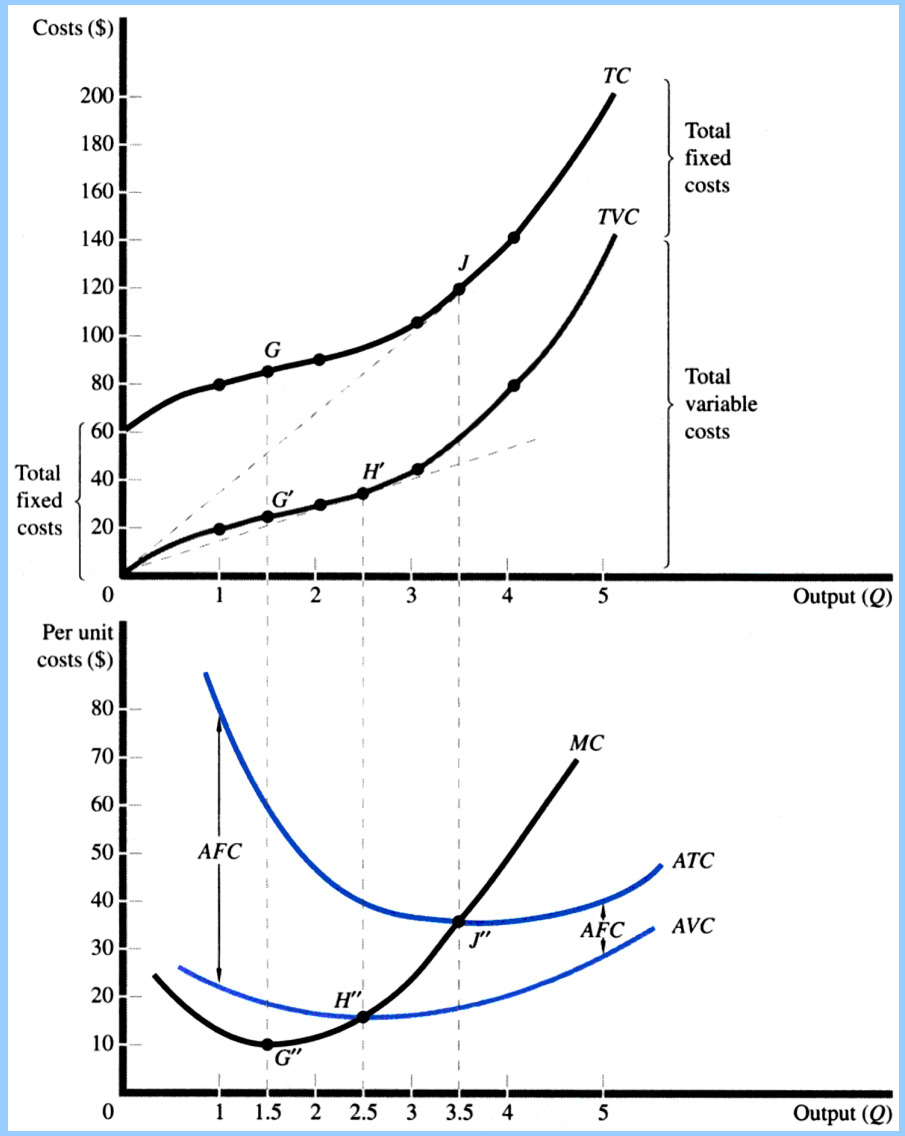
Average Variable Cost = AVC = TVC/Q

ATC = AFC + AVC

Marginal Cost = ΔTC/ΔQ = ΔTVC/ΔQ

Short-Run Cost Functions

Q	TFC	TVC	TC	AFC	AVC	ATC	MC
0	$60	$0	$60	-	-	-	-
1	60	20	80	$60	$20	$80	$20
2	60	30	90	30	15	45	10
3	60	45	105	20	15	35	15
4	60	80	140	15	20	35	35
5	60	135	195	12	27	39	55



Short-Run Cost Functions

Average Variable Cost

$$AVC = TVC/Q = w/AP_L$$

Marginal Cost

$$\Delta TC/\Delta Q = \Delta TVC/\Delta Q = w/MP_L$$

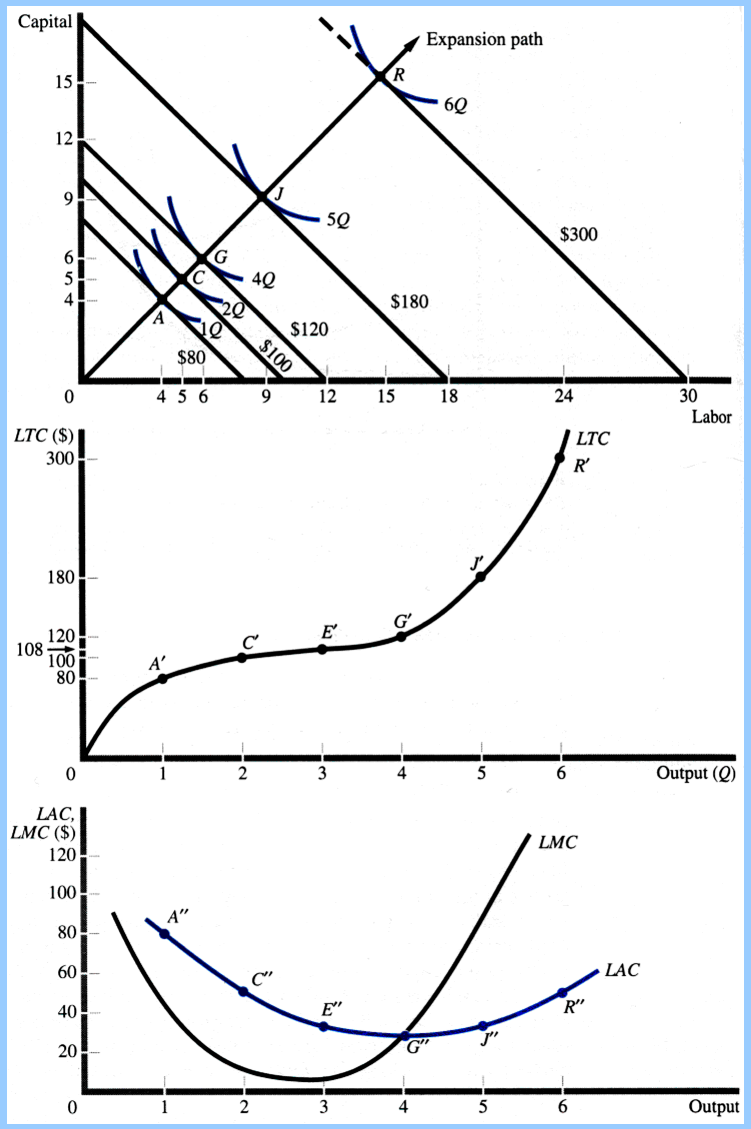
Long-Run Cost Curves

Long-Run Total Cost = LTC = f(Q)

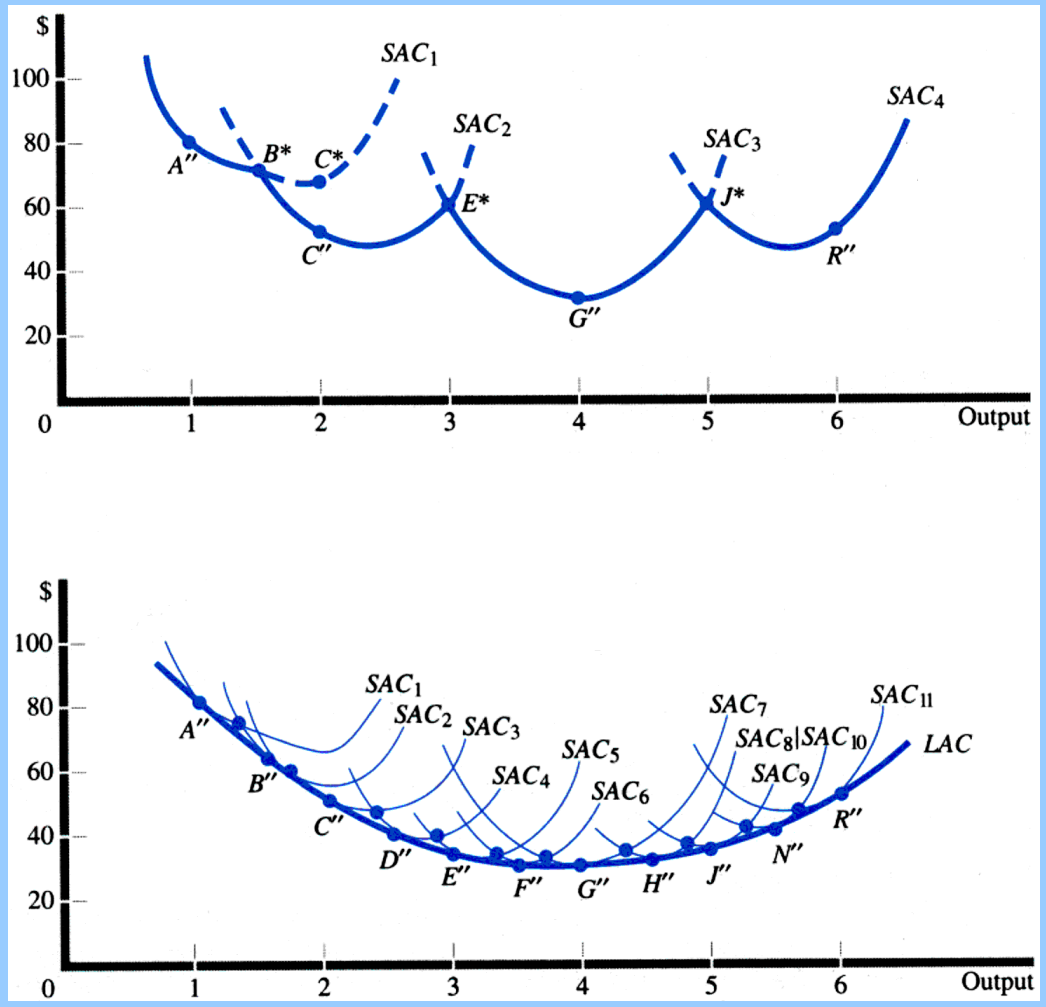
Long-Run Average Cost = LAC = LTC/Q

Long-Run Marginal Cost = LMC = ΔLTC/ΔQ

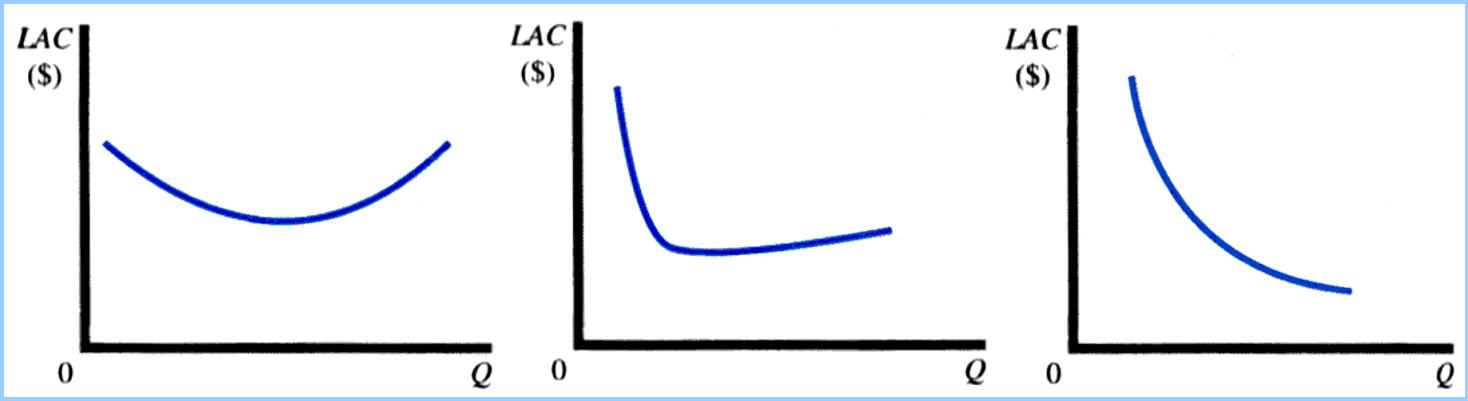
Derivation of Long-Run Cost Curves



Relationship Between Long-Run and Short-Run Average Cost Curves



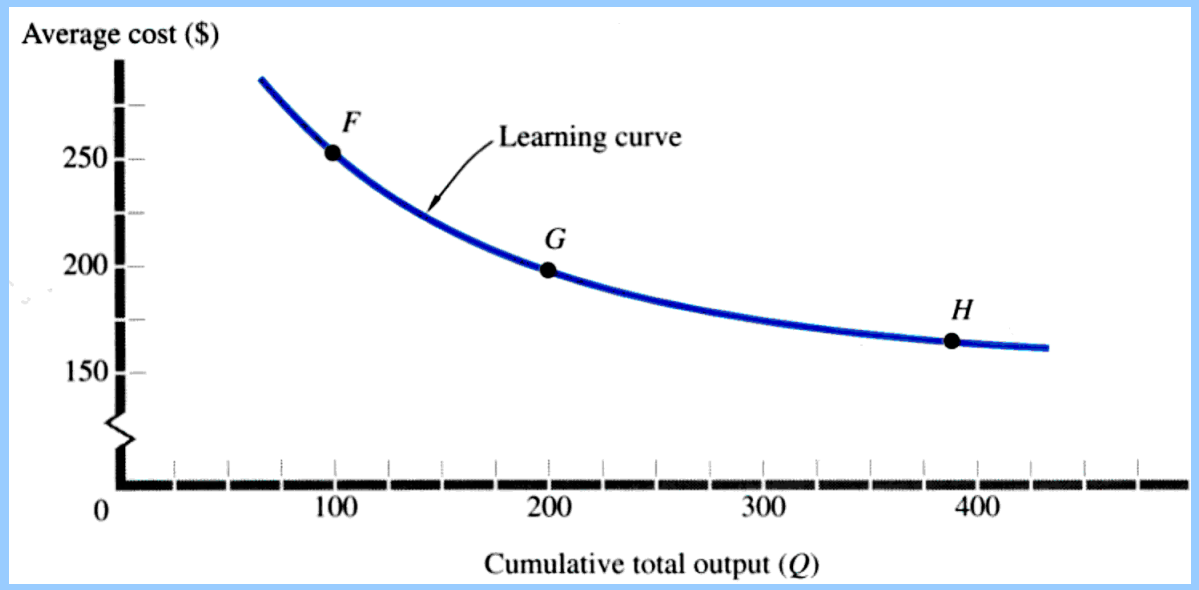
Possible Shapes of the LAC Curve



Learning Curves

Average Cost of Unit Q = C = aQ^b

Estimation Form: log C = log a + b Log Q



Minimizing Costs Internationally

- Foreign Sourcing of Inputs
- New International Economies of Scale
- Immigration of Skilled Labor
- Brain Drain

Logistics or Supply Chain Management

- Merges and integrates functions
  - Purchasing
  - Transportation
  - Warehousing
  - Distribution
  - Customer Services
- Source of competitive advantage

Logistics or Supply Chain Management

- Reasons for the growth of logistics
  - Advances in computer technology
    - Decreased cost of logistical problem solving
  - Growth of just-in-time inventory management
    - Increased need to monitor and manage input and output flows
  - Globalization of production and distribution
    - Increased complexity of input and output flows

Cost-Volume-Profit Analysis

$$\text{Total Revenue} = TR = (P)(Q)$$

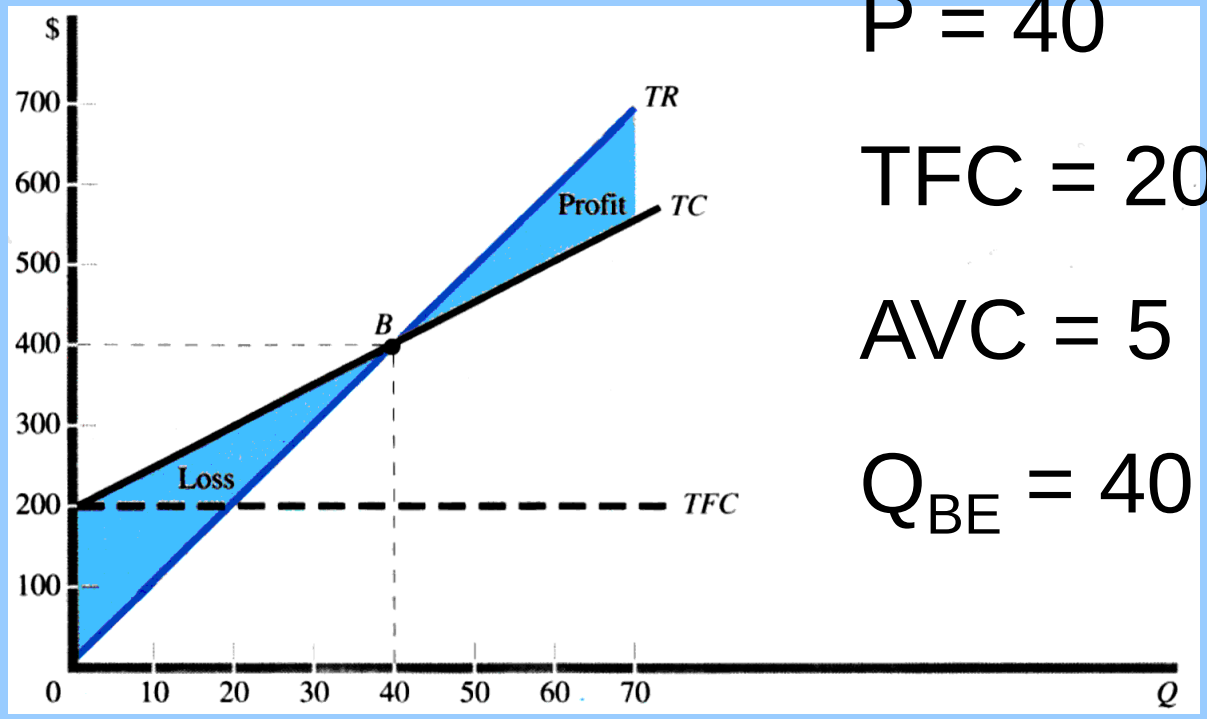
$$\text{Total Cost} = TC = TFC + (AVC)(Q)$$

$$\text{Breakeven Volume } TR = TC$$

$$(P)(Q) = TFC + (AVC)(Q)$$

$$Q_{BE} = TFC/(P - AVC)$$

Cost-Volume-Profit Analysis



P = 40

TFC = 200

AVC = 5

Q_{BE} = 40

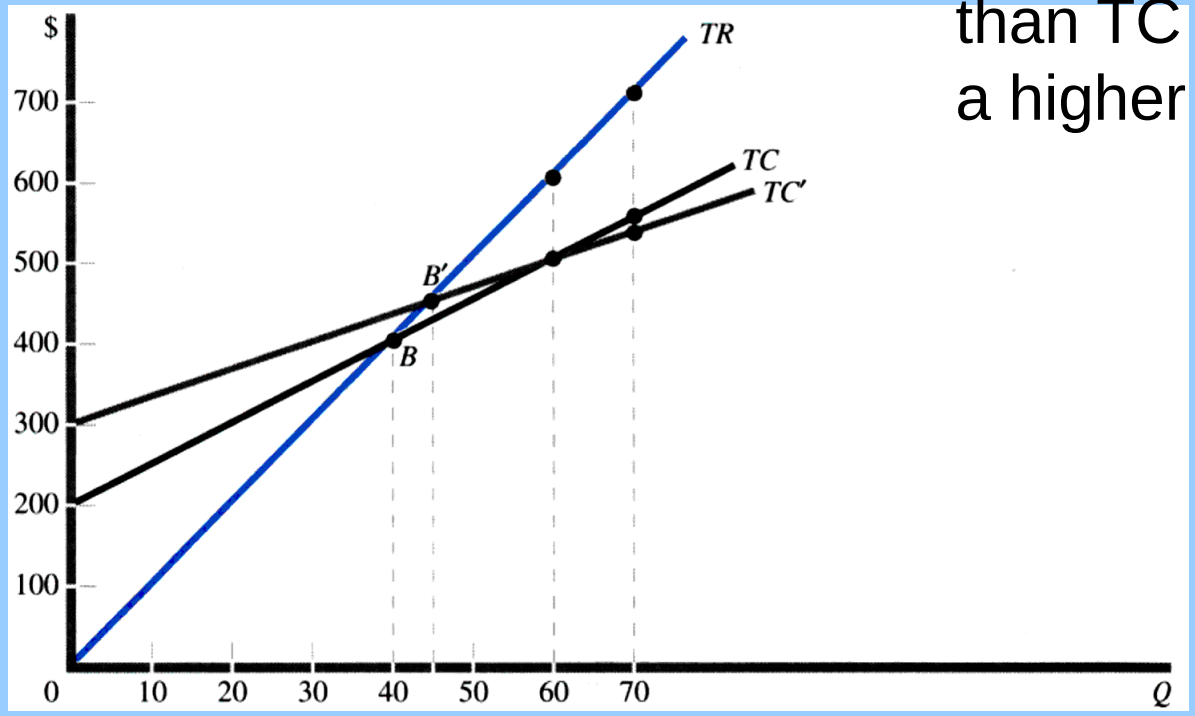
Operating Leverage

Operating Leverage = TFC/TVC

Degree of Operating Leverage = DOL

$$DOL = \frac{\%\Delta\pi}{\%\Delta Q} = \frac{Q(P - AVC)}{Q(P - AVC) - TFC}$$

Operating Leverage



TC' has a higher DOL than TC and therefore a higher Q_{BE}

Empirical Estimation Data Collection Issues

- Opportunity Costs Must be Extracted from Accounting Cost Data
- Costs Must be Apportioned Among Products
- Costs Must be Matched to Output Over Time
- Costs Must be Corrected for Inflation

Empirical Estimation

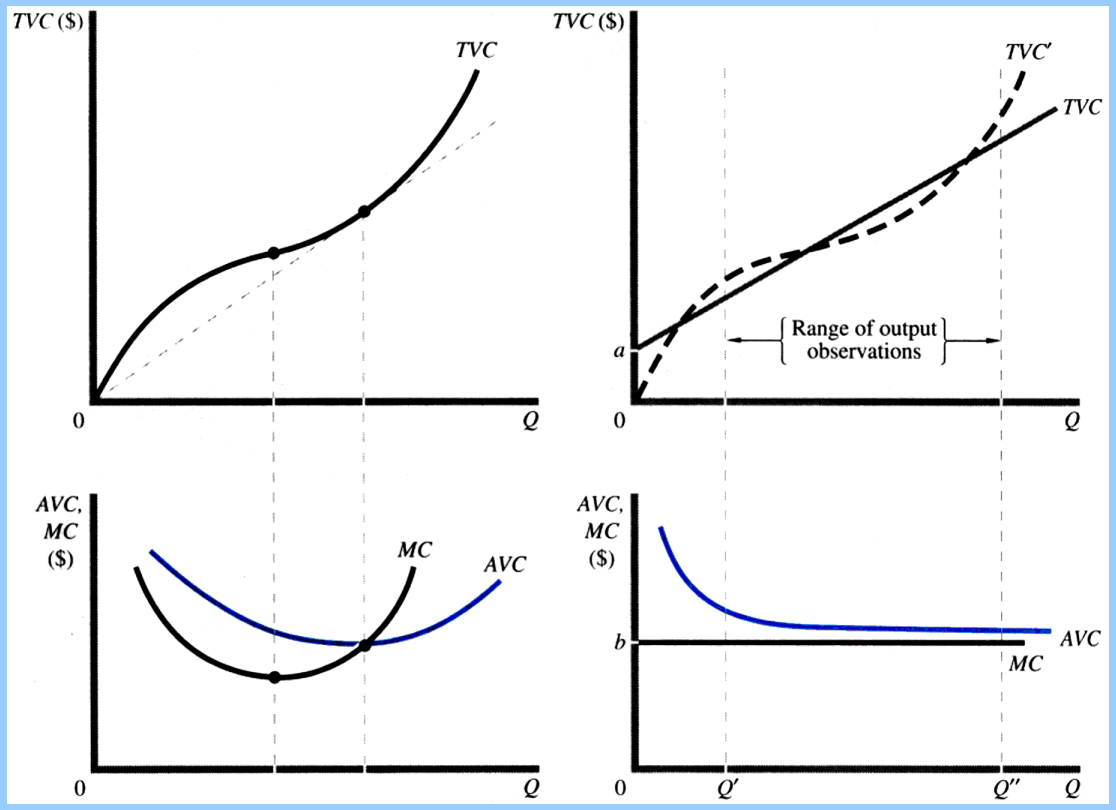
Functional Form for Short-Run Cost Functions

Theoretical Form	Linear Approximation
$TVC = aQ + bQ^2 + cQ^3$	$TVC = a + bQ$
$AVC = \frac{TVC}{Q} = a + bQ + cQ^2$	$AVC = \frac{a}{Q} + b$
$MC = a + 2bQ + 3cQ^2$	$MC = b$

Empirical Estimation

Theoretical Form

Linear Approximation



Empirical Estimation Long-Run Cost Curves

- Cross-Sectional Regression Analysis
- Engineering Method
- Survival Technique

Empirical Estimation

Actual LAC versus empirically estimated LAC'