CFA Notes

Yu Chen

The Chinese University of HongKong, Department of Mechanical and Automation Engineering

E-mail: anschen@link.cuhk.edu.hk

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1 Demand and Production

1.1 Demand

Demand function: $Q_x^d = f(p_x, p_y, I, \cdots)$, where p_x, p_y are price of products x, y, I is income.
Demand Curve: $Q_x^d = f(p_x)$

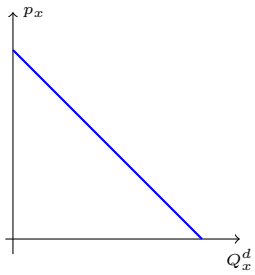

Figure 1. Demand curve

There are three kinds of **Elasticity of Demand**

- Own-Price: $E_{p_x}^d = \frac{\Delta Q_x^d / Q_x^d}{\Delta p_x / p_x}$
  - when $|E_{p_x}^d| > 1$, **elastic**, if $|E_{p_x}^d| = \infty$, **perfect elastic**
  - when $|E_{p_x}^d| = 1$, **unit elastic**
  - when $|E_{p_x}^d| < 1$, **inelastic**, if $|E_{p_x}^d| = 0$, **perfect inelastic**
- Cross-Price: $E_{p_y}^d = \frac{\Delta Q_x^d / Q_x^d}{\Delta p_y / p_y}$
  - when $E_{p_y}^d > 0$, (X, Y) substitutes
  - when $E_{p_y}^d < 0$, (X, Y) complements
- Income: $E_I^d = \frac{\Delta Q_x^d / Q_x^d}{\Delta I / I}$
  - when $E_I^d > 0$, normal goods
  - when $E_I^d < 0$, inferior goods

elastic $\Rightarrow$ price $p\downarrow$, total revenue $\uparrow$
inelastic $\Rightarrow$ price $p\downarrow$, total revenue $\uparrow$
Two famous effects – **Substitution Effect** and **Income Effect**

- Substitution Effect: There are two products A and B, when p_A decreases, people are willing to buy more A
- Income Effect: (a) positive: for normal goods, when price decreases, demand increases; (b) for inferior goods, when price decreases, demand decreases.

There are two kinds of products violating law of demand:

- **Giffen Goods**: Giffen goods must be inferior goods, since it caused by that substitution effect is weaker than income effect
- **Veblen Goods**: luxury goods, which not only violates law of demand, but also violates economic principle

1.2 Product

Production function: $Q = f(K, L)$
Total revenue: $TR = \sum_t P_t Q_t$.
Average revenue: $AR = \frac{TR}{Q}$.
Marginal revenue: $MR = \frac{\Delta TR}{\Delta Q}$, with relation,

$$MR = P(1 - |\frac{1}{E^d_{p_x}}|) \tag{1.1}$$

Opportunity Cost(Economic cost): 1) explicit cost(accounting cost), 2) implicit cost. Hence, profit can be divided into two classes:

$$\begin{aligned} \text{AccountingProfit} =& \text{TR} - \text{AccountingCost} \\ \text{EconomicProfit} =& \text{TR} - \text{EconomicCost} \\ =& \text{AccountingProfit} - \text{implicitprofit} \end{aligned} \tag{1.2}$$

Besides, total revenue can be divided to TFC(total fixed cost) and TVC(total variable cost) shown in Fig.2 Also, we can consider average quantity, such as AFC $= \frac{\text{TFC}}{Q}$, AVC $= \frac{\text{TVC}}{Q}$, even, marginal cost, MC $= \frac{\Delta \text{TC}}{\Delta Q}$.

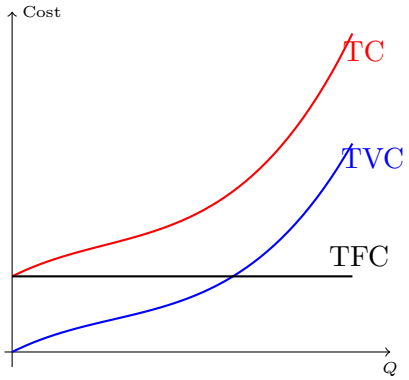

Figure 2. Cost curve