Chapter 1: The Fundamentals of Managerial Economics.

Manager: a person who directs resources to achieve a stated goal

Economics: the science of making decisions in the presence of scarce resources

Managerial Economics: the study of how to direct scarce resources in the way that most efficiently achieves a managerial goal

Principles of effective management:

1. Identify goals and constraints
2. Recognize the nature and importance of profits
3. Understand incentives
4. Understand markets
5. Recognize the time value of money
6. Use marginal analysis

Accounting Profit = revenue – cost

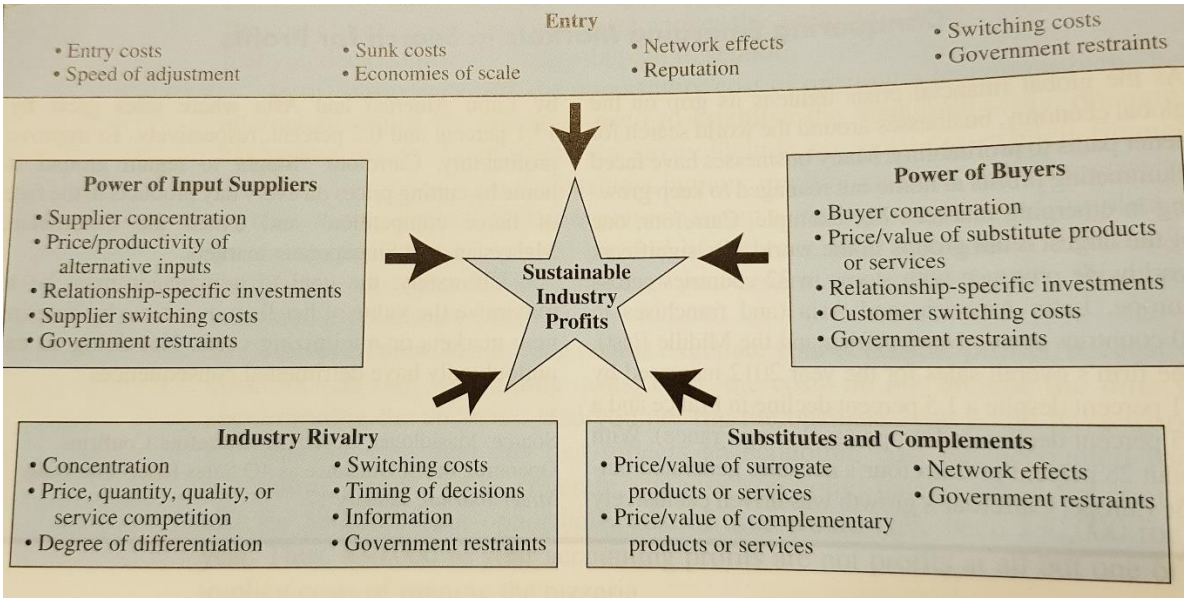
Economic Profit = revenue – opportunity cost

Opportunity Cost = cost of a resource + cost of giving up the best alternative

PRINCIPLE ➔ profits signal to resource holders where resources are most highly valued by society

Understanding markets:

1- Understand the five forces framework



2- Understand rivalry:

- Consumer-producer
- Consumer-consumer
- Producer-producer
- Government and the market

3- Understand basic finance concepts:

- Present value
- Net present value

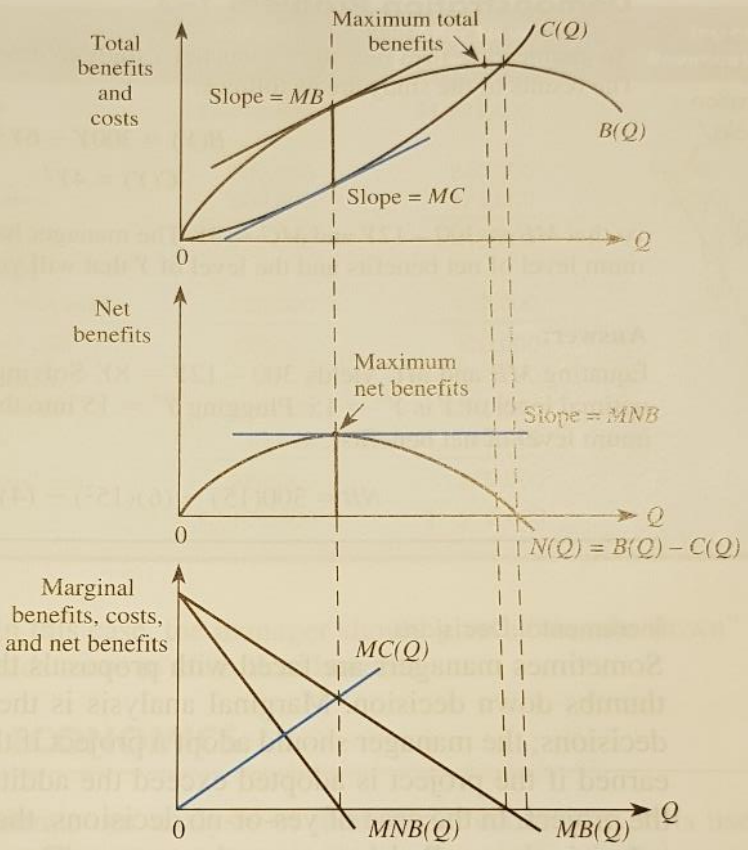
PRINCIPLE ➔ maximizing profits means maximizing the value of the firm, which is the present value of current and future profits

Marginal Analysis: comparing the marginal benefits with the marginal costs

PRINCIPLE ➔ increase the control variable up to the point where marginal benefits equal marginal costs

(1) Control Variable Q	(2) Total Benefits $B(Q)$	(3) Total Costs $C(Q)$	(4) Net Benefits $N(Q)$	(5) Marginal Benefit $MB(Q)$	(6) Marginal Cost $MC(Q)$	(7) Marginal Net Benefit $MNB(Q)$ $\Delta(4)$ or (5) – (6)
Given	Given	Given	(2) – (3)	$\Delta(2)$	$\Delta(3)$	
0	0	0	0	—	—	—
1	90	10	80	90	10	80
2	170	30	140	80	20	60
3	240	60	180	70	30	40
4	300	100	200	60	40	20
5	350	150	200	50	50	0
6	390	210	180	40	60	−20
7	420	280	140	30	70	−40
8	440	360	80	20	80	−60
9	450	450	0	10	90	−80
10	450	550	−100	0	100	−100

FIGURE 1–2 Determining the Optimal Level of a Control Variable: The Continuous Case



A Calculus Alternative

Since the slope of a function is the derivative of that function, the preceding principle means that the derivative of a given function is the marginal value of that function. For example,

$$MB = \frac{dB(Q)}{dQ}$$

$$MC = \frac{dC(Q)}{dQ}$$

$$MNB = \frac{dN(Q)}{dQ}$$

Chapter 2: Market Forces – Demand and Supply.

Law of demand: price and quantity demanded are inversely related.

➔ Change in quantity demanded =/= change in demand

Demand shifters:

1. Income
    a. Normal good
    b. Inferior good
2. Prices of related goods
    a. Substitutes
    b. Complements
3. Advertising and consumer tastes
4. Population
5. Consumer expectations
6. Other factors
    a. Health factors
    b. Newly born

The demand function:

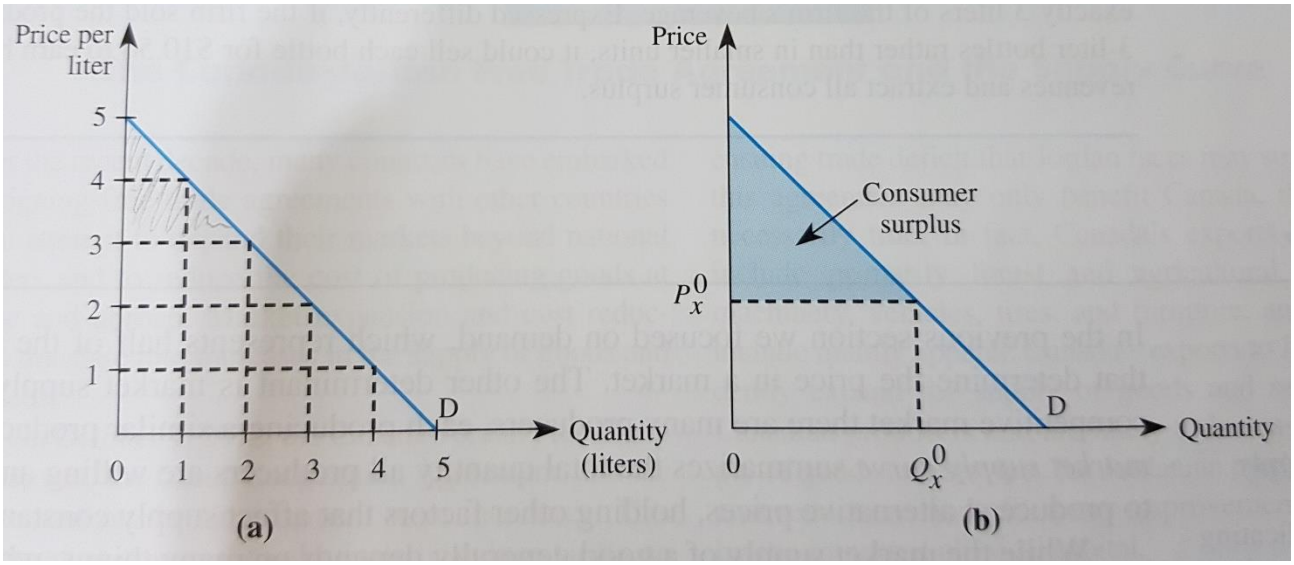
Quantity demanded = function of (price of product, price of related products, income, other factors)

Linear demand function:

$$Q_x^d = \alpha_0 + \alpha_x P_x + \alpha_y P_y + \alpha_M M + \alpha_H H$$

- Alpha x < 0 → by the law of demand
- Alpha y
    - > 0 → product X is a substitute for product Y
    - < 0 → product X is a compliment for product Y
- Alpha m
    - > 0 → product X is a normal good
    - < 0 → product X is an inferior good

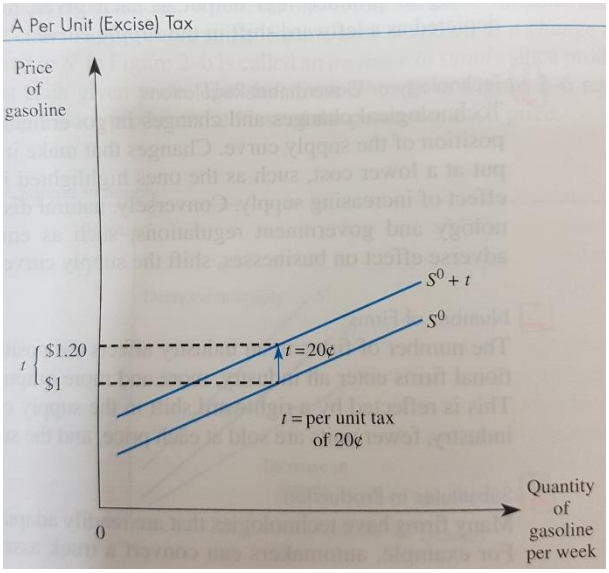
Consumer surplus: the value consumers get from a good but do not have to pay for.

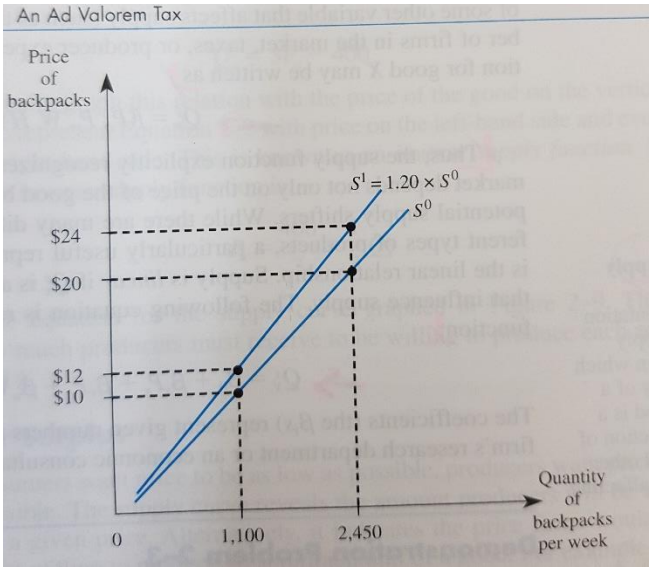


➔ Change in quantity supplied =/= change in supply

Supply shifters:

1. Input prices
2. Technology or government regulation
3. Number of firms
4. Substitutes in production
5. Producer expectations
6. Taxes
    a. Excise tax
    b. Percentage tax





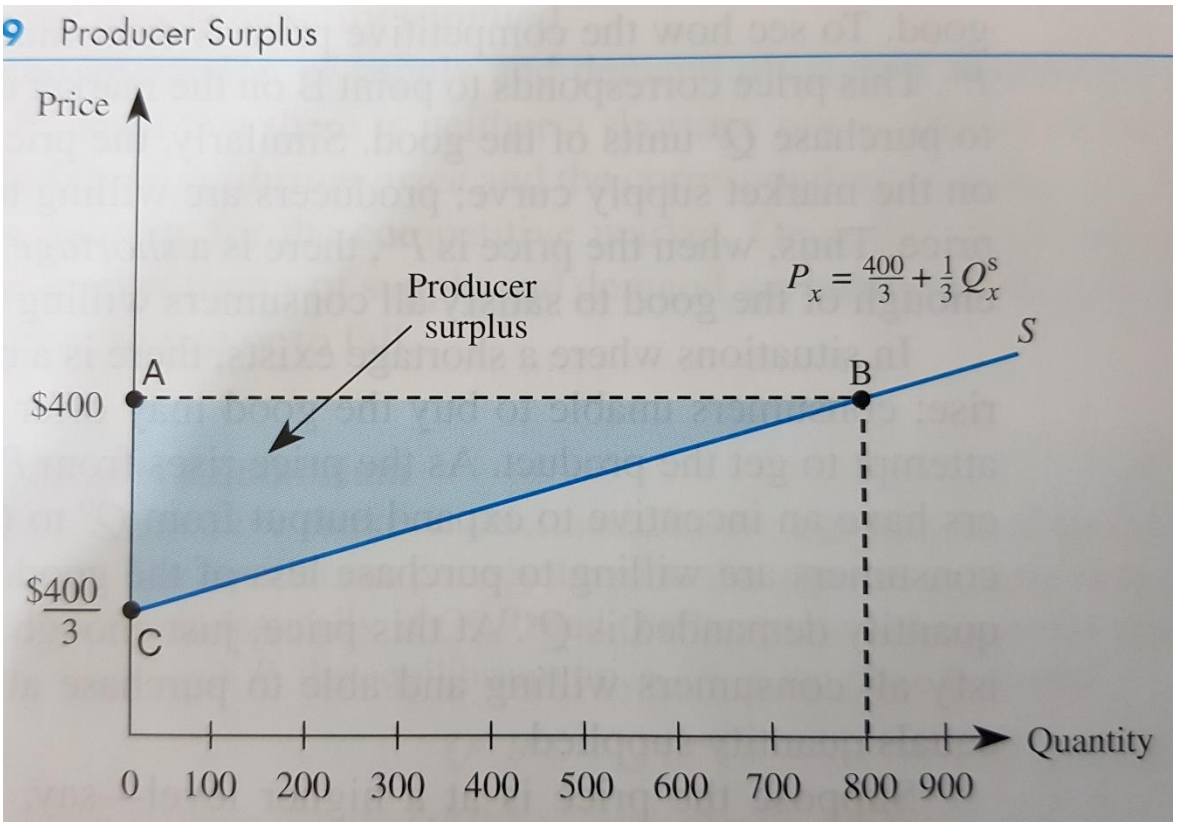
The supply function:

Quantity supplied = function of (price of product, price of related products, price of inputs, other factors)

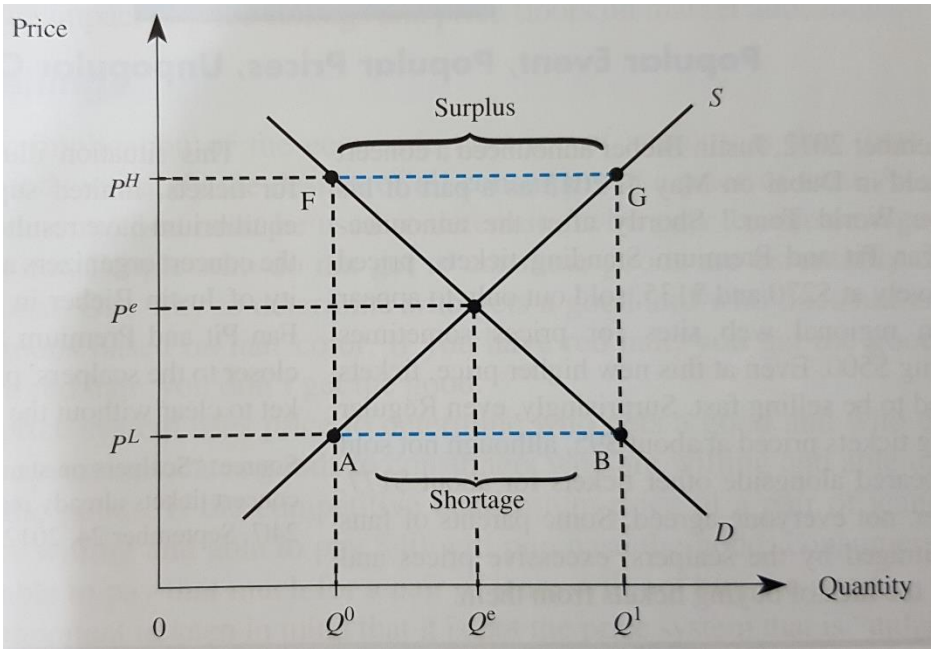
Linear supply function:

$$Q_x^s = \beta_0 + \beta_x P_x + \beta_r P_r + \beta_w W + \beta_H H$$

Producer surplus: the amount producers receive in excess of the amount necessary to induce them to produce the good.



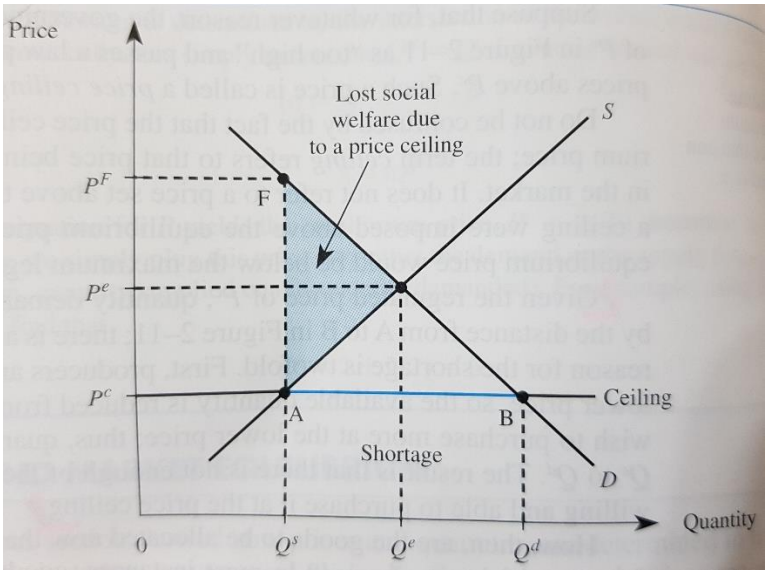
Market equilibrium: the price of a good in a competitive market is determined by the interaction of market supply and market demand for the good.



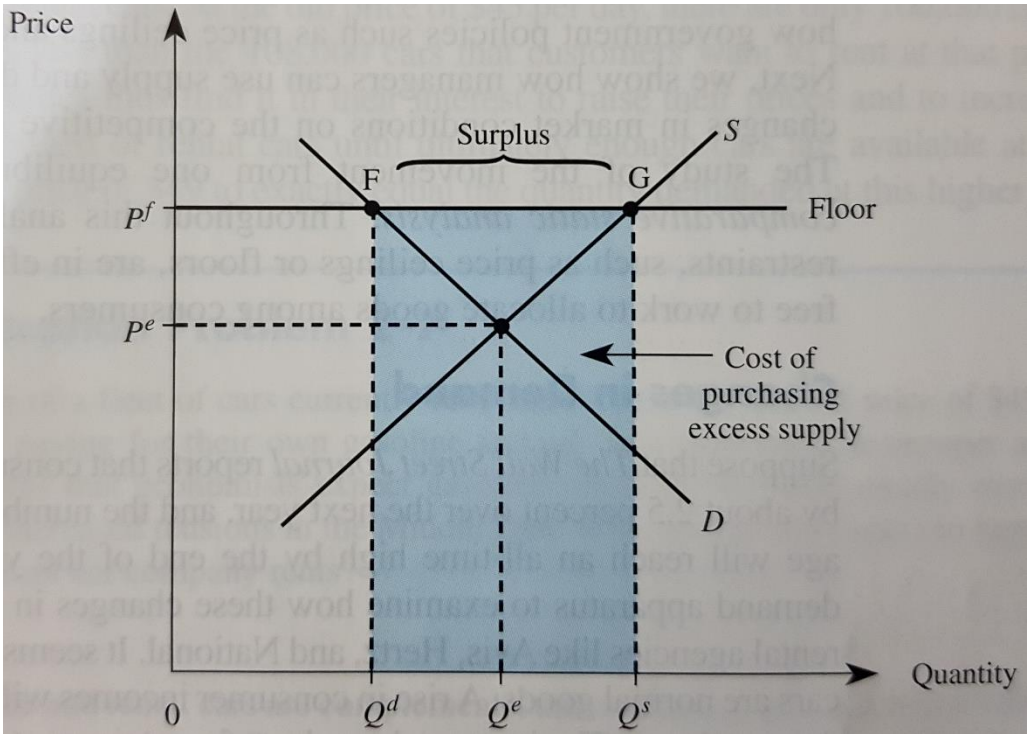
Price restrictions and market equilibrium:

1. Price ceiling
    a. For it to be effective, it needs to be below the equilibrium price
    b. After implementation:
        i. Producers are willing to produce less at a lower price
        ii. Consumers are willing to purchase more at a lower price
    c. Full economic price

$$\underset{\text{Full economic price}}{P^F} = \underset{\text{Dollar price}}{P^c} + \underset{\text{Nonpecuniary price}}{(P^F - P^c)}$$



2. Price floor
    a. For it to be effective, it needs to be above the equilibrium price
    b. After implementation:
        i. More is produced than consumers are willing to purchase and a surplus is developed



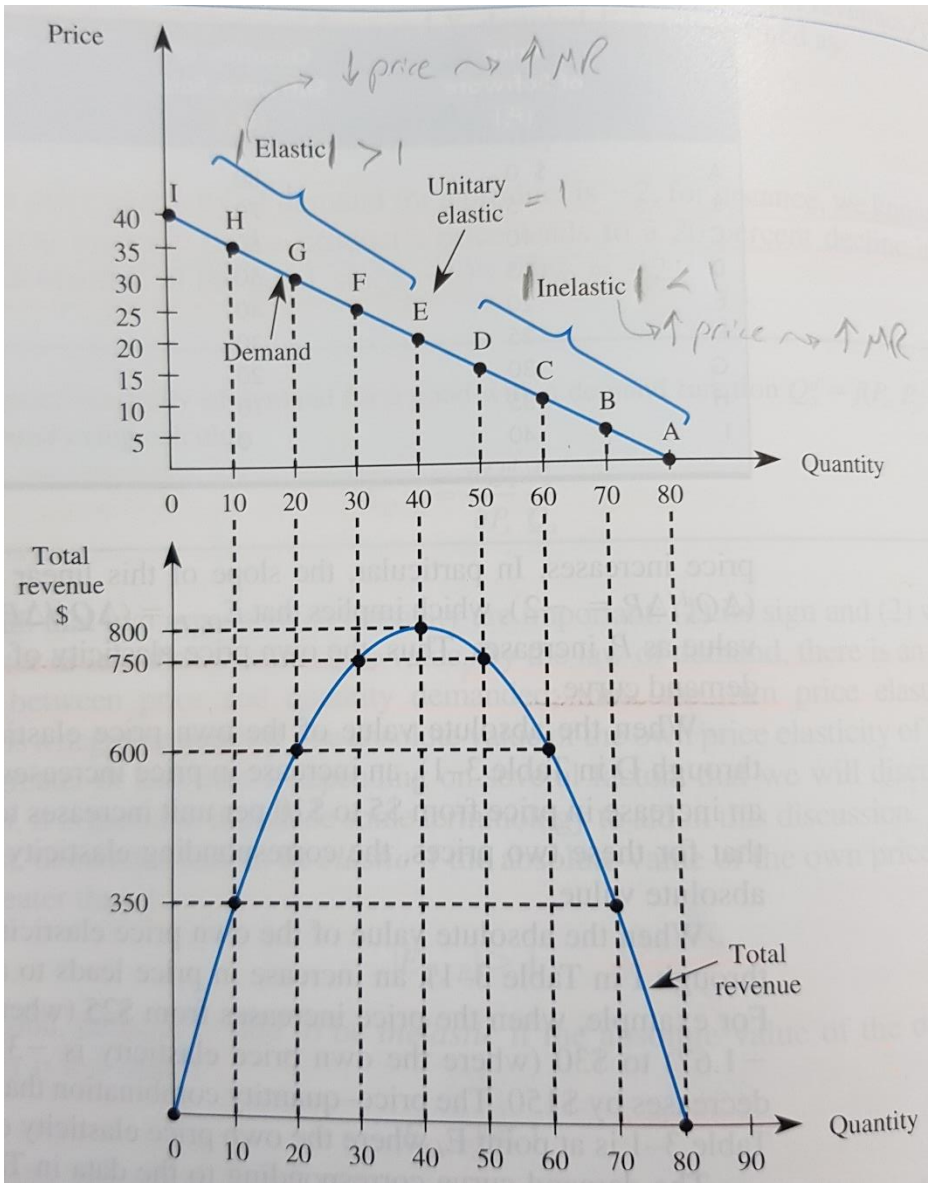
Chapter 3: Quantitate Demand Analysis.

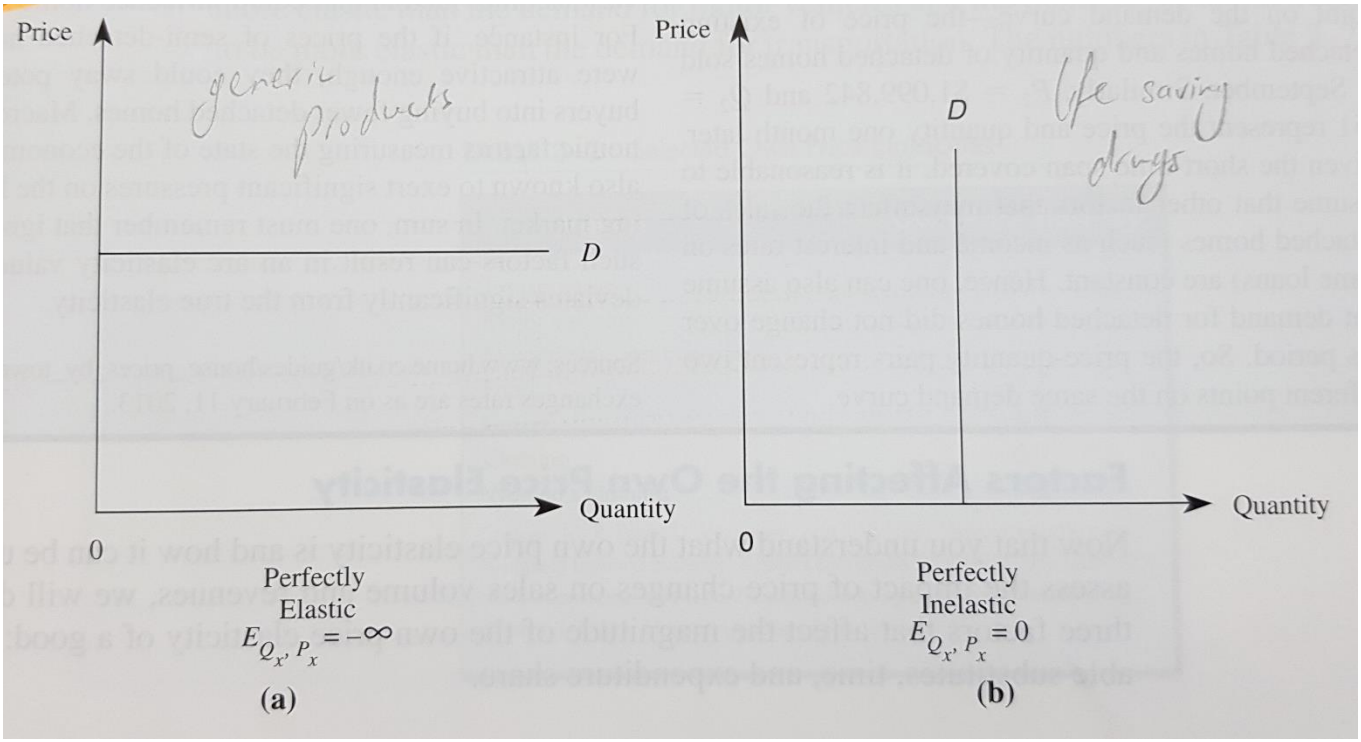
Note: regression analysis part is not included.

Elasticity: a measure of the responsiveness of one variable to changes in another variable.

Own price elasticity:

$$E_{Q_x, P_x} = \frac{\%\Delta Q_x^d}{\%\Delta P_x}$$





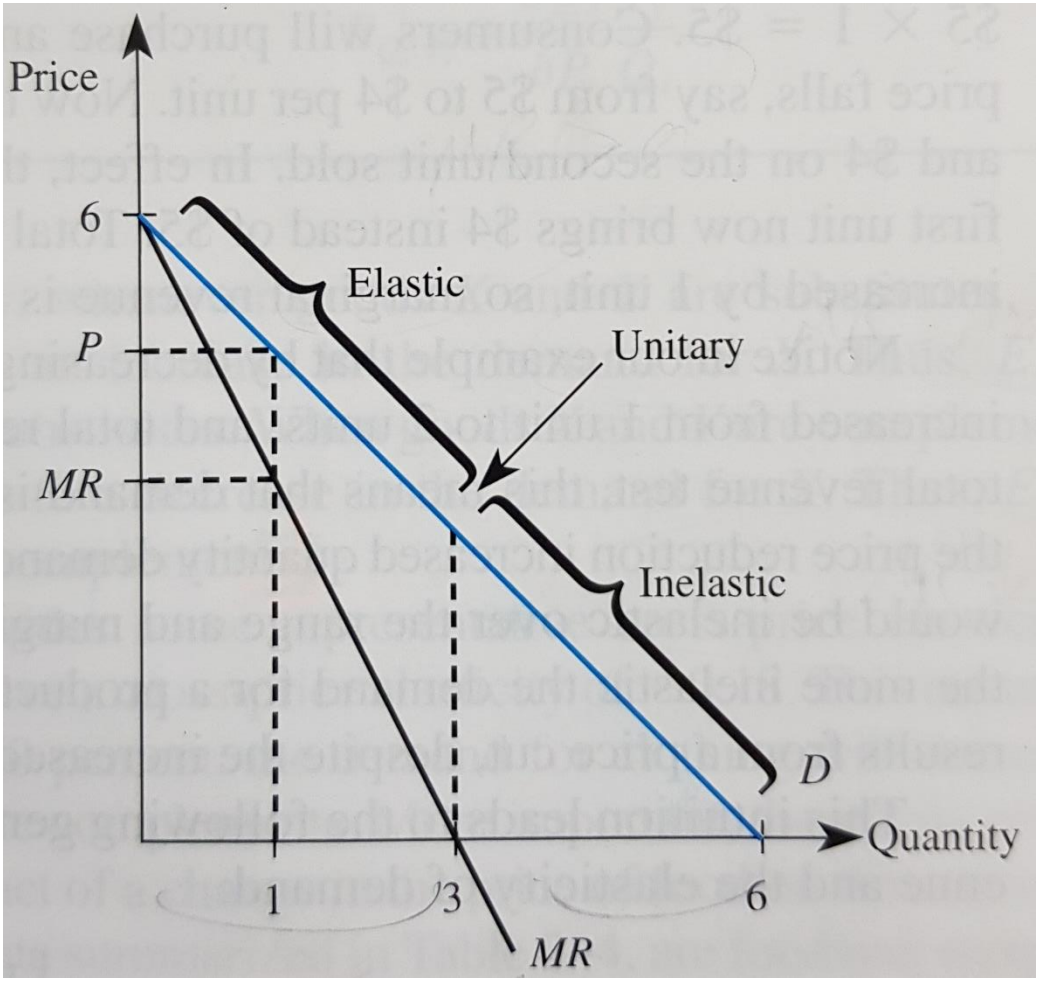
Arc elasticity (used as an estimation):

$$E^{Arc} = \frac{\Delta Q^d}{\Delta P} \times \frac{Average\ P}{Average\ Q}$$

Factors affecting the own price elasticity:

1. Available substitutes
    a. High number of substitutes → elastic (e.g., broadly defined commodity)
    b. Low number of substitutes → inelastic (e.g., specific commodity)
2. Time
    a. Short term → inelastic
    b. Long term → elastic
3. Expenditure share
    a. Small share of budget → inelastic
    b. Large share of budget → elastic

Demand and marginal revenue:



$$MR = P\left[\frac{1+E}{E}\right]$$

Cross-price elasticity: a measure of the responsiveness of the demand for a good to changes in the price of a related good.

$$E_{Q_x,\,P_y} = \frac{\%\Delta Q_x^d}{\%\Delta P_y}$$

- If cross-price elasticity > 0 → substitutes
- If cross-price elasticity < 0 → compliments

Income elasticity:

$$E_{Q_x, M} = \frac{\%\Delta Q_x^d}{\%\Delta M}$$

- If income elasticity > 0 → normal good
- If income elasticity < 0 → inferior good

Linear demand functions elasticities:

Given an estimate of a linear demand function, it is quite easy to calculate the various elasticities of demand.

Formula: Elasticities for Linear Demand. If the demand function is linear and given by

$$Q_x^d = \alpha_0 + \alpha_x P_x + \alpha_y P_y + \alpha_M M + \alpha_H H$$

the elasticities are

own price elasticity: $E_{Q_x, P_x} = \alpha_x \frac{P_x}{Q_x}$

cross-price elasticity: $E_{Q_x, P_y} = \alpha_y \frac{P_y}{Q_x}$

income elasticity: $E_{Q_x, M} = \alpha_M \frac{M}{Q_x}$

Log-linear demand functions elasticities:

Formula: Elasticities for Log-Linear Demand. When the demand function for good X is log-linear and given by

$$\ln Q_x^d = \beta_0 + \beta_x \ln P_x + \beta_y \ln P_y + \beta_M \ln M + \beta_H \ln H$$

the elasticities are

own price elasticity: $E_{Q_x, P_x} = \beta_x$

cross-price elasticity: $E_{Q_x, P_y} = \beta_y$

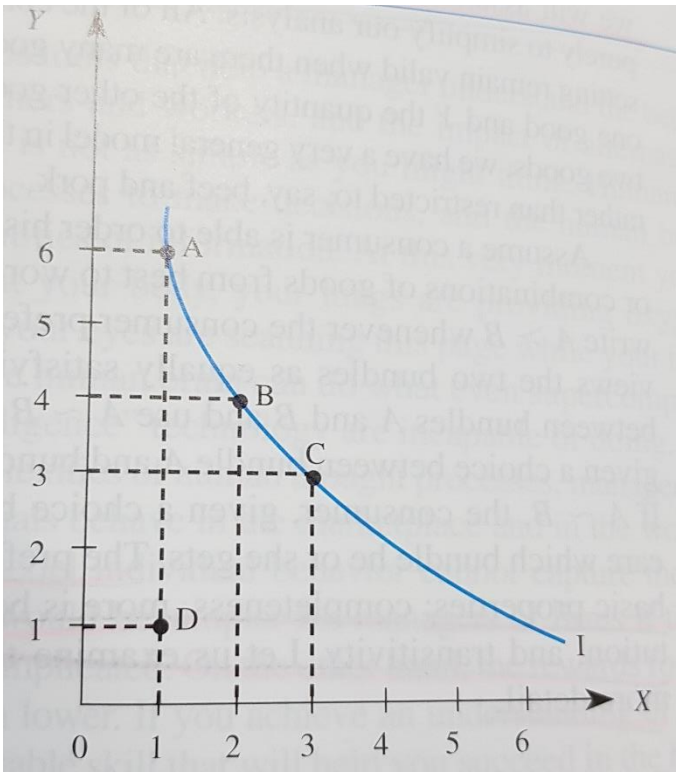
income elasticity: $E_{Q_x, M} = \beta_M$

Chapter 4: The Theory of Individual Behavior.

To characterize consumer behavior, we need to consider the following:

1. Consumer opportunities (i.e., what he can afford / budget)
2. Consumer preferences (i.e., choices based on the available budget)
    a. Completeness (either A > B or A ~ B)
    b. More is better
    c. Diminishing marginal rate of substitution (i.e., indifference curves are convex from the origin)
    d. Transitivity (if A > B and B > C then A > C)

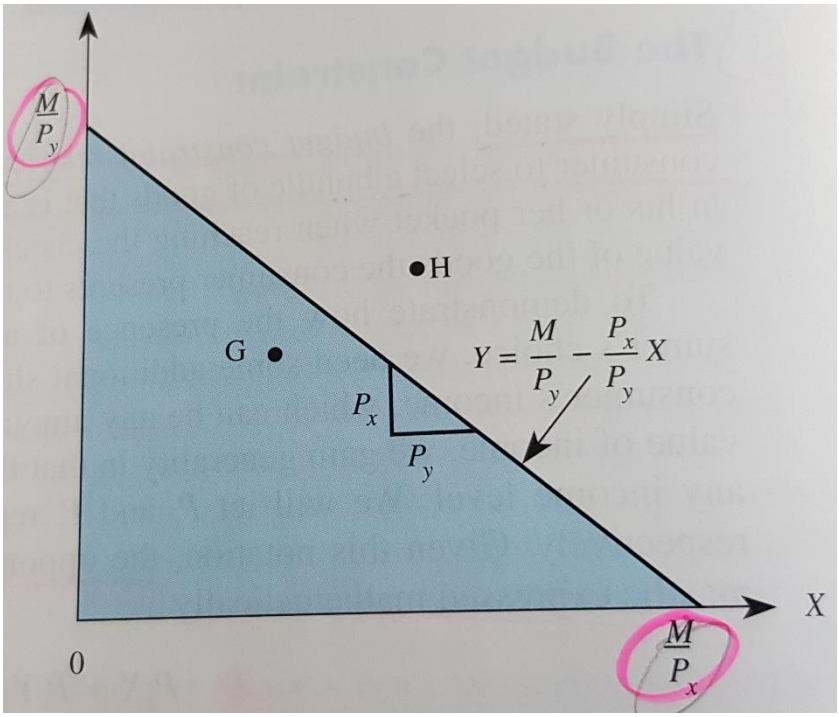
Indifference curve: a curve that defines the combinations of two goods that give a consumer the same level of satisfaction.



Constraints on consumer behavior:

1. The budget constraint

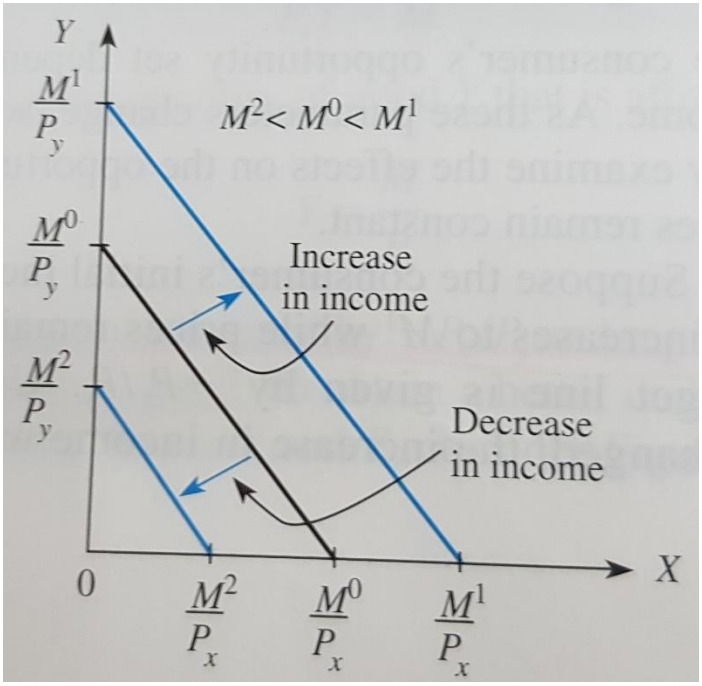
$$P_x X + P_y Y \leq M$$



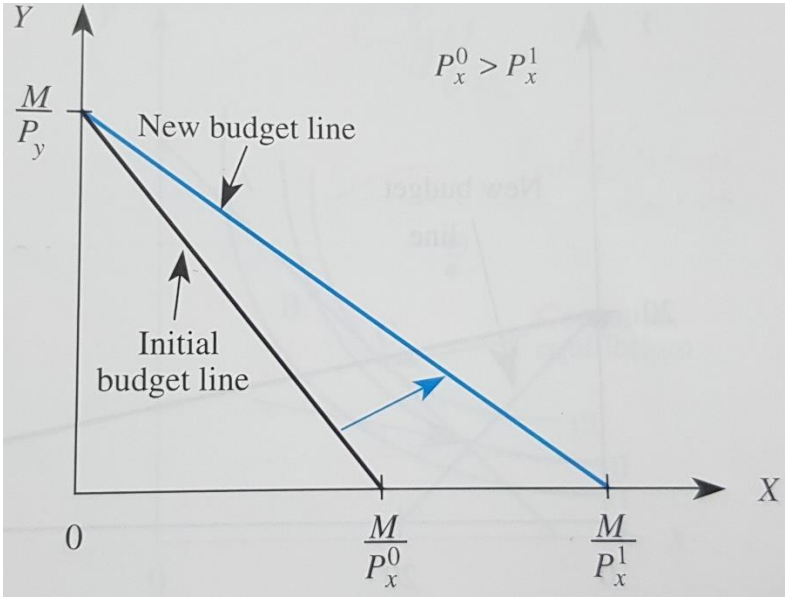
The market rate of substitution: the rate at which one good may be traded for another in the market.

$$-P_x/P_y$$

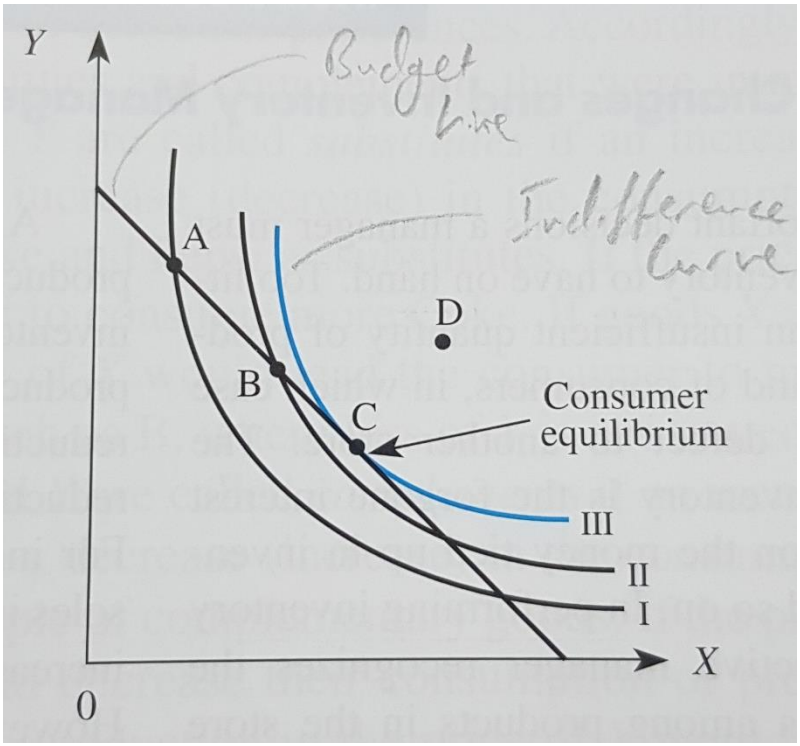
2. Changes in income



3. Changes in prices



Consumer equilibrium: the equilibrium consumption bundle is the affordable bundle that yields the greatest satisfaction to the customer.

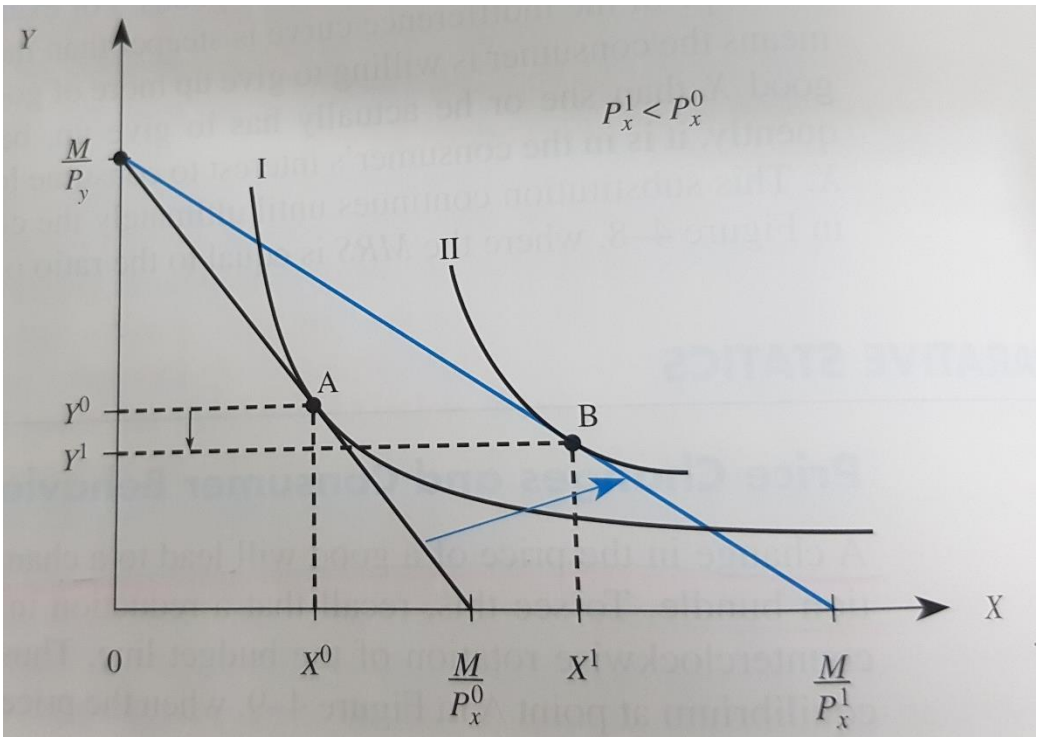


Note: here the slope of the indifference curve is equal to the slope of the budget line.

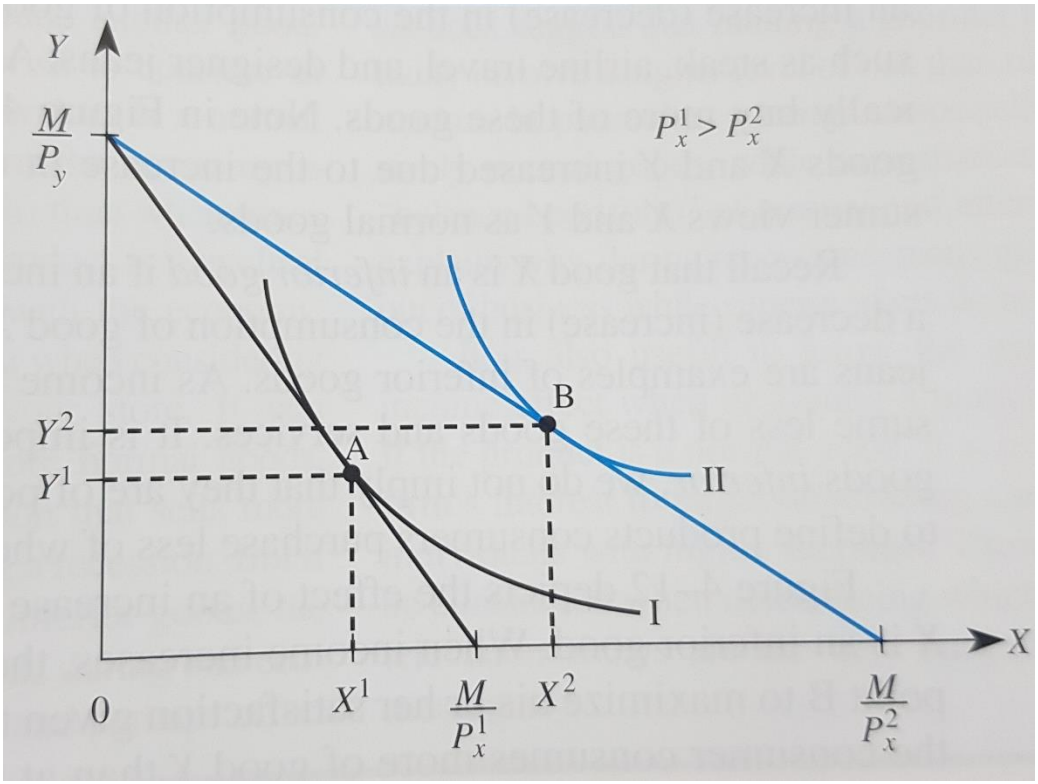
$$MRS = \frac{P_x}{P_y}$$

The effects of price changes to consumer behavior

1. Change in consumer equilibrium duo to a decrease in the price of good X (note that good Y is a substitute for X)

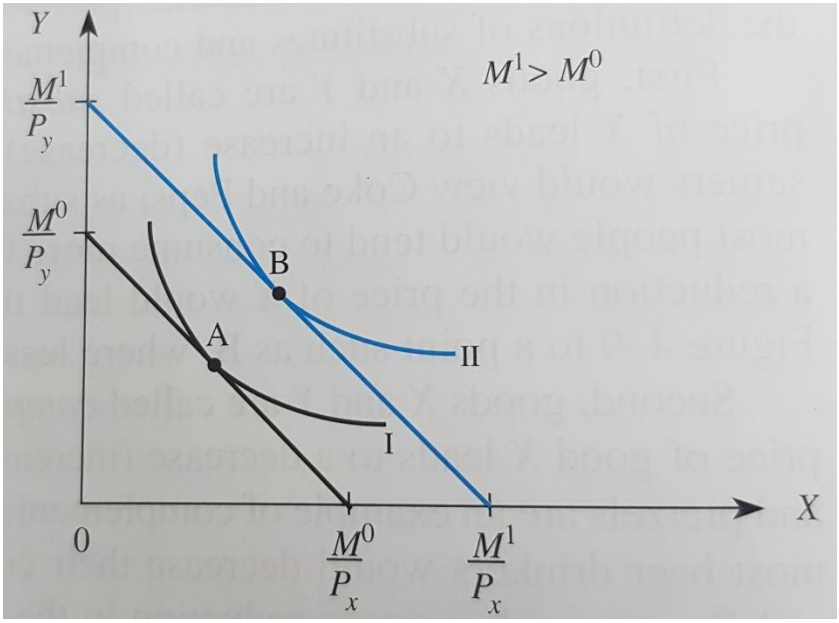


2. When the price of good X falls, the consumption of complementary good Y rises

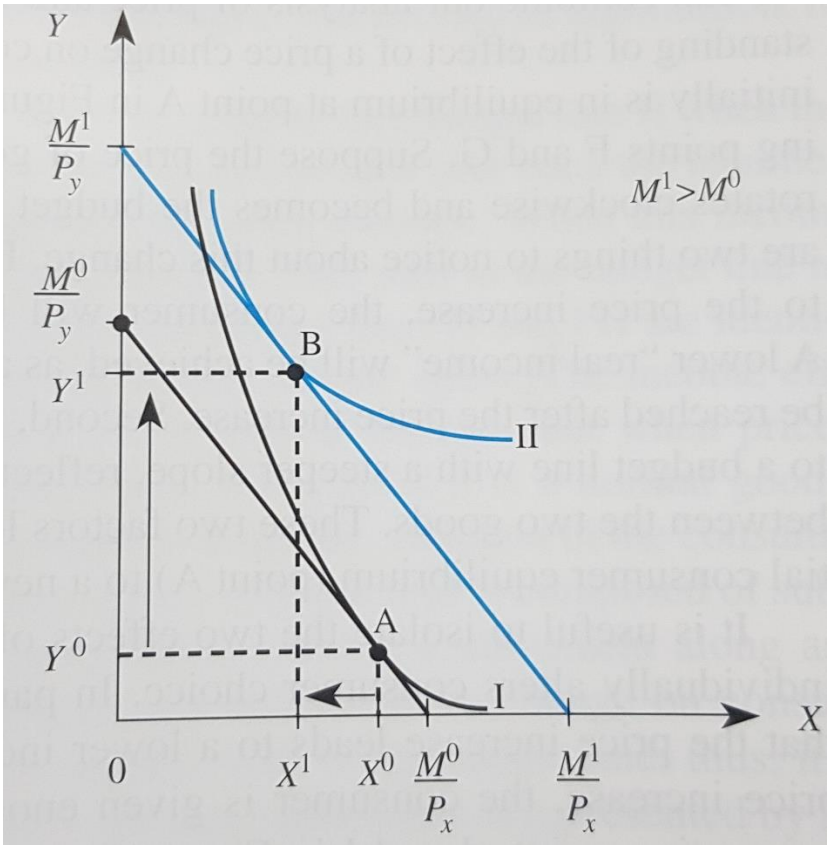


The effects of income changes to consumer behavior

1. An increase in income increases the consumption of normal goods

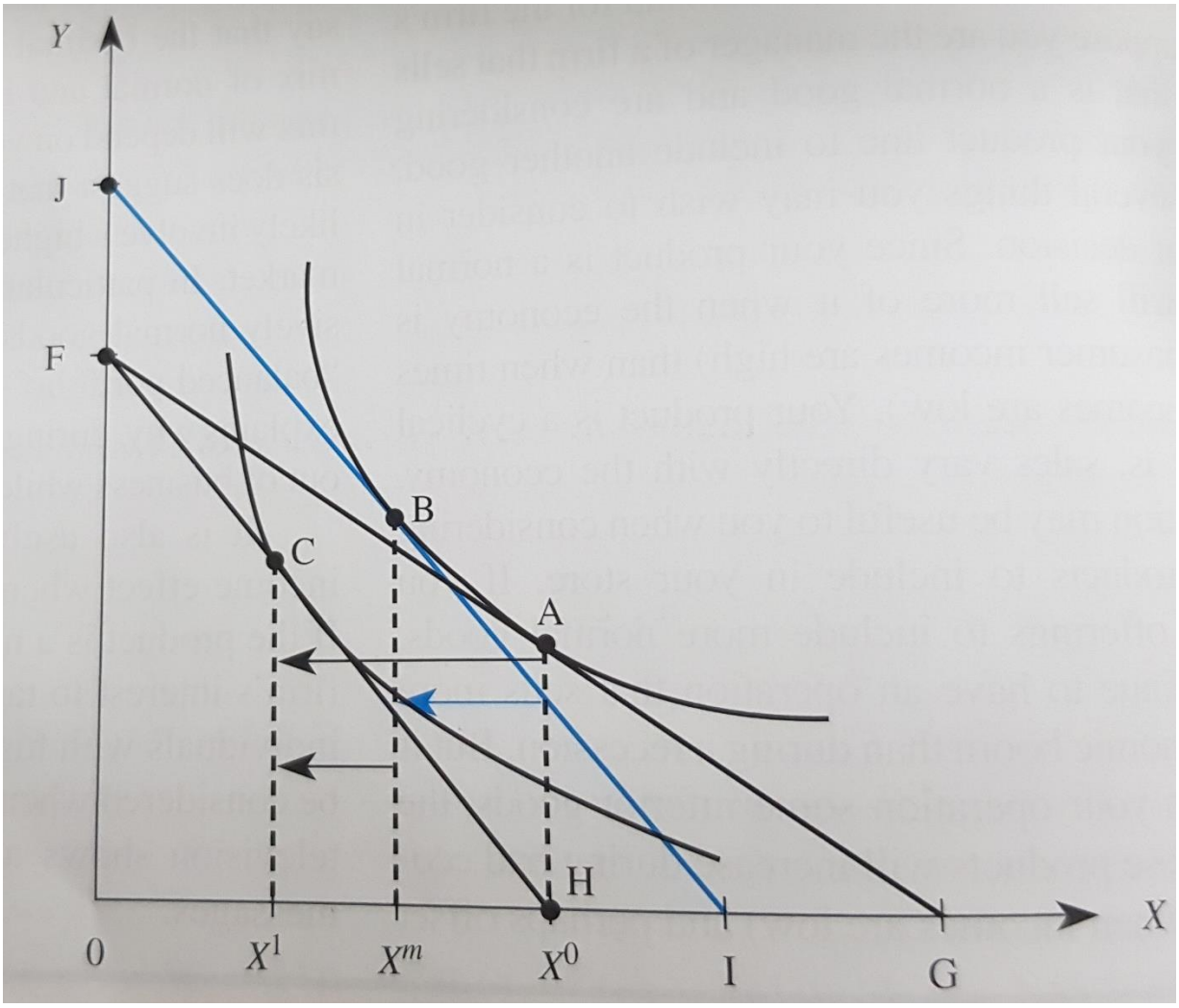


2. An increase in income decreases the equilibrium consumption of good X, an inferior good



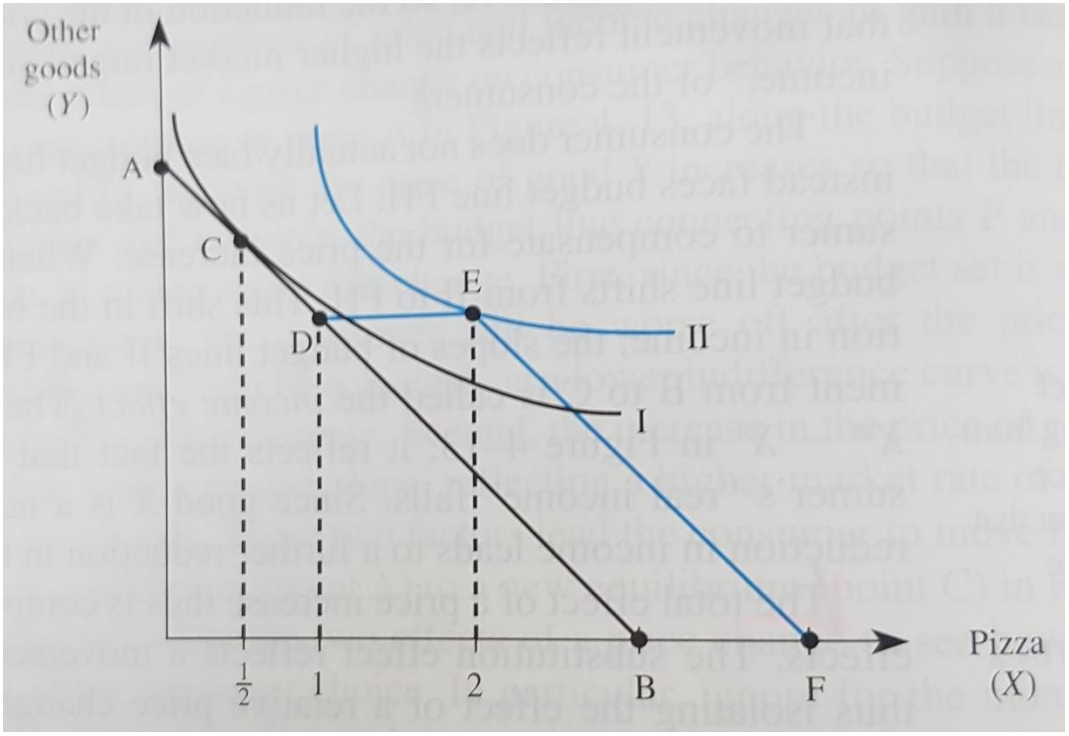
The effects of an increase in price to consumer behavior

1. **Substitution effect:** the movement along a given indifference curve that results from a change in the relative prices of goods, holding real income constant.
2. **Income effect:** the movement from one indifference curve to another that results from the change in real income cause by a price change.

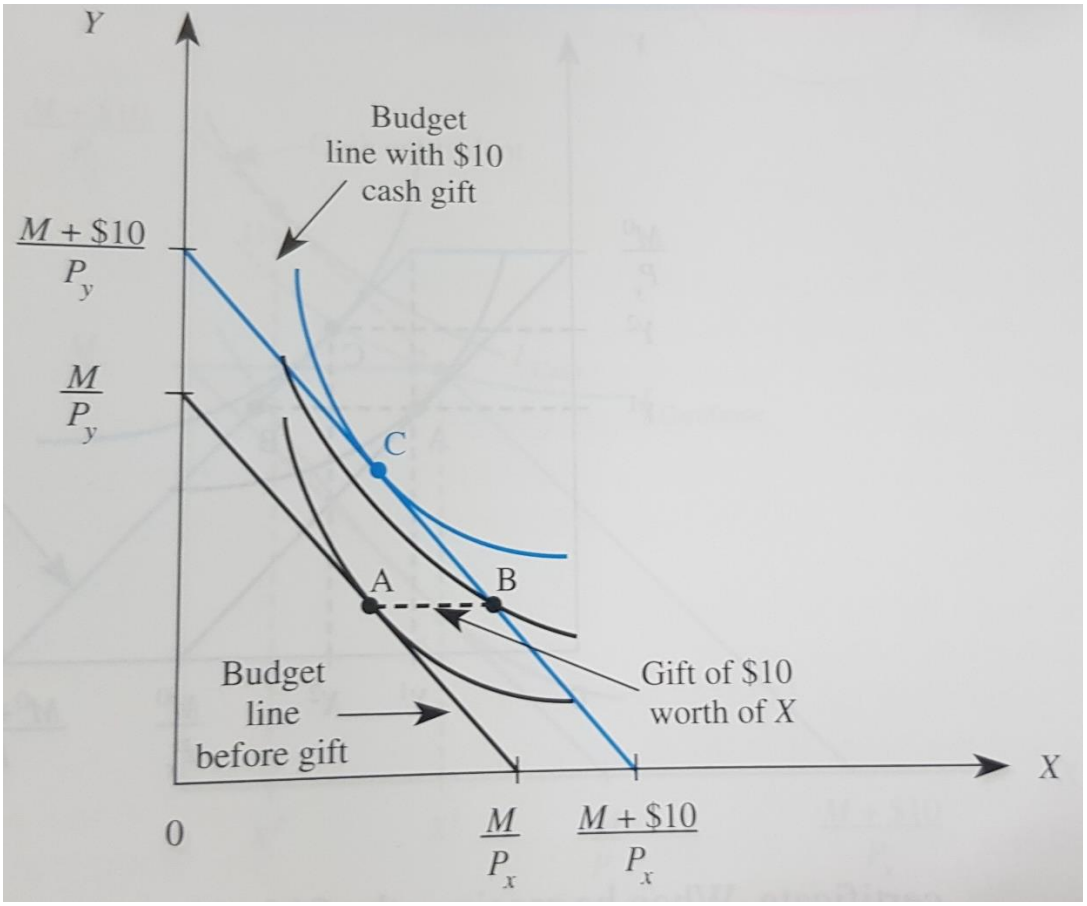


Applications of indifference curve analysis:

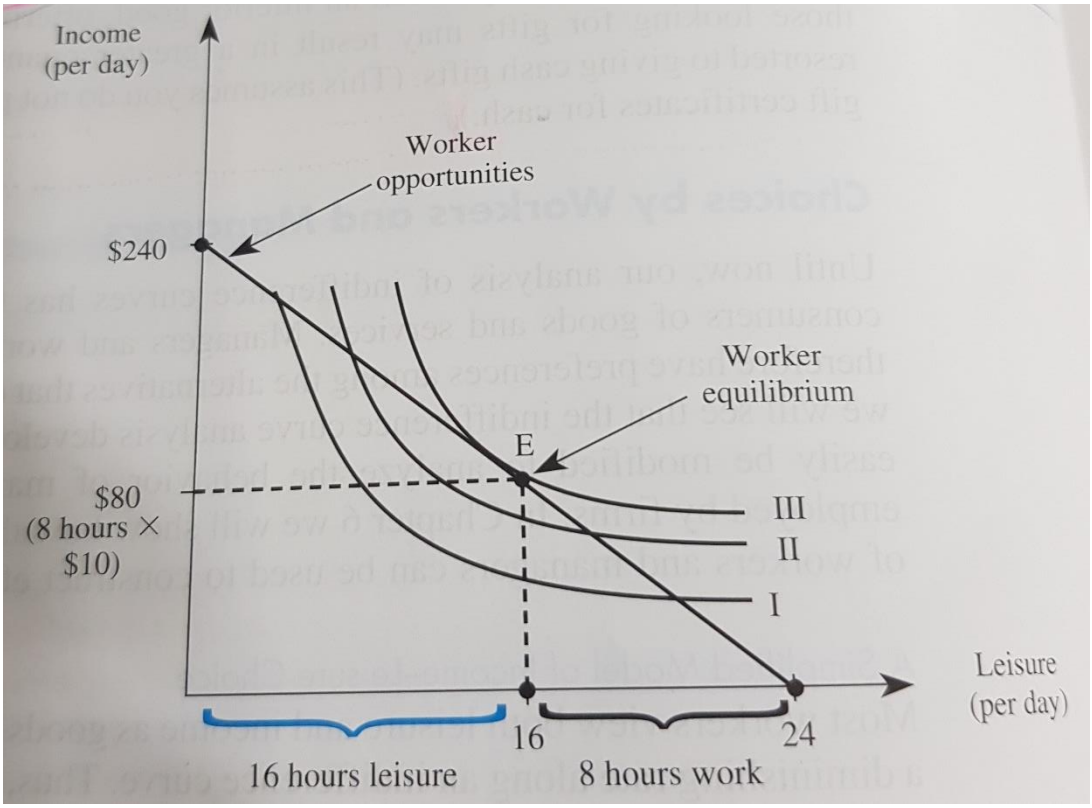
1. Choices by consumers
    a. Buy one, get one free



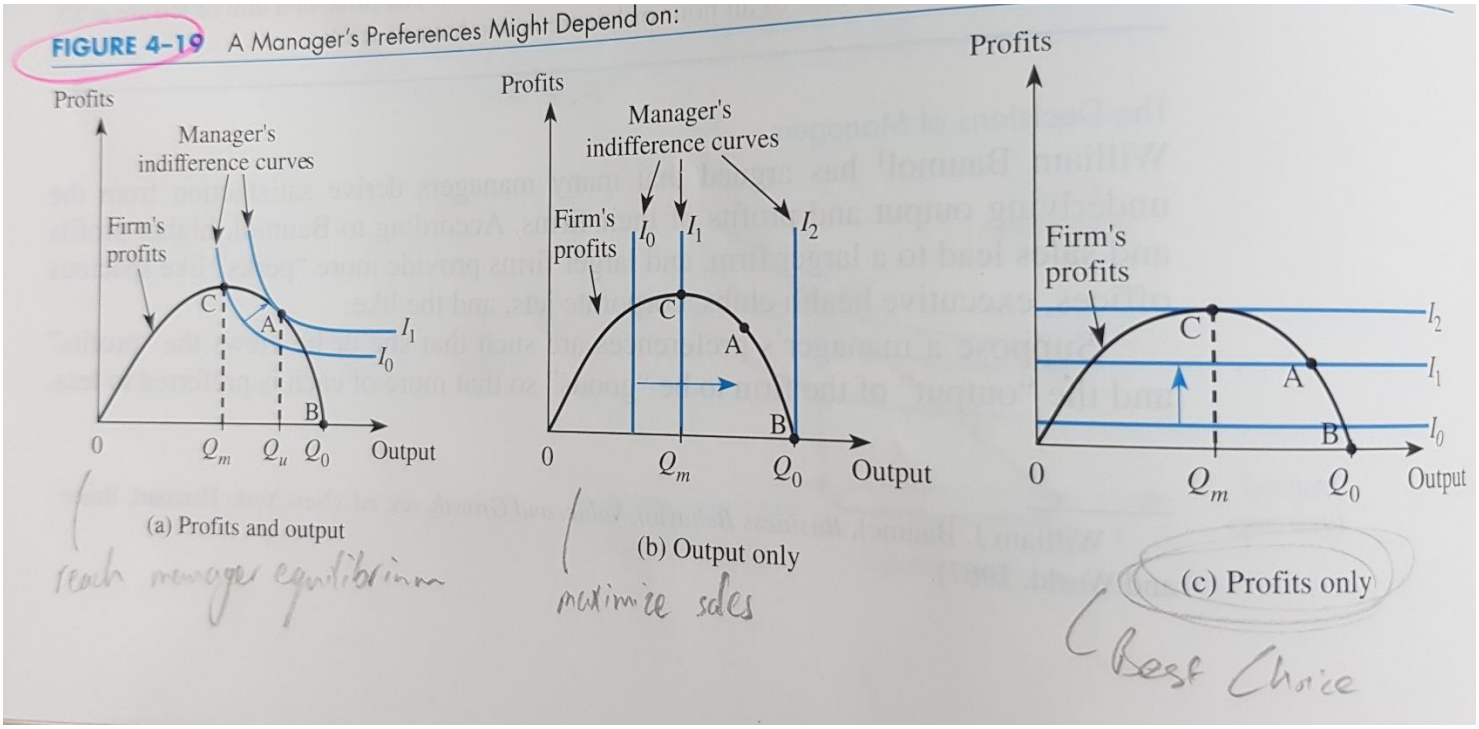
    b. Cash gifts, in-kind gifts, and gift certificates



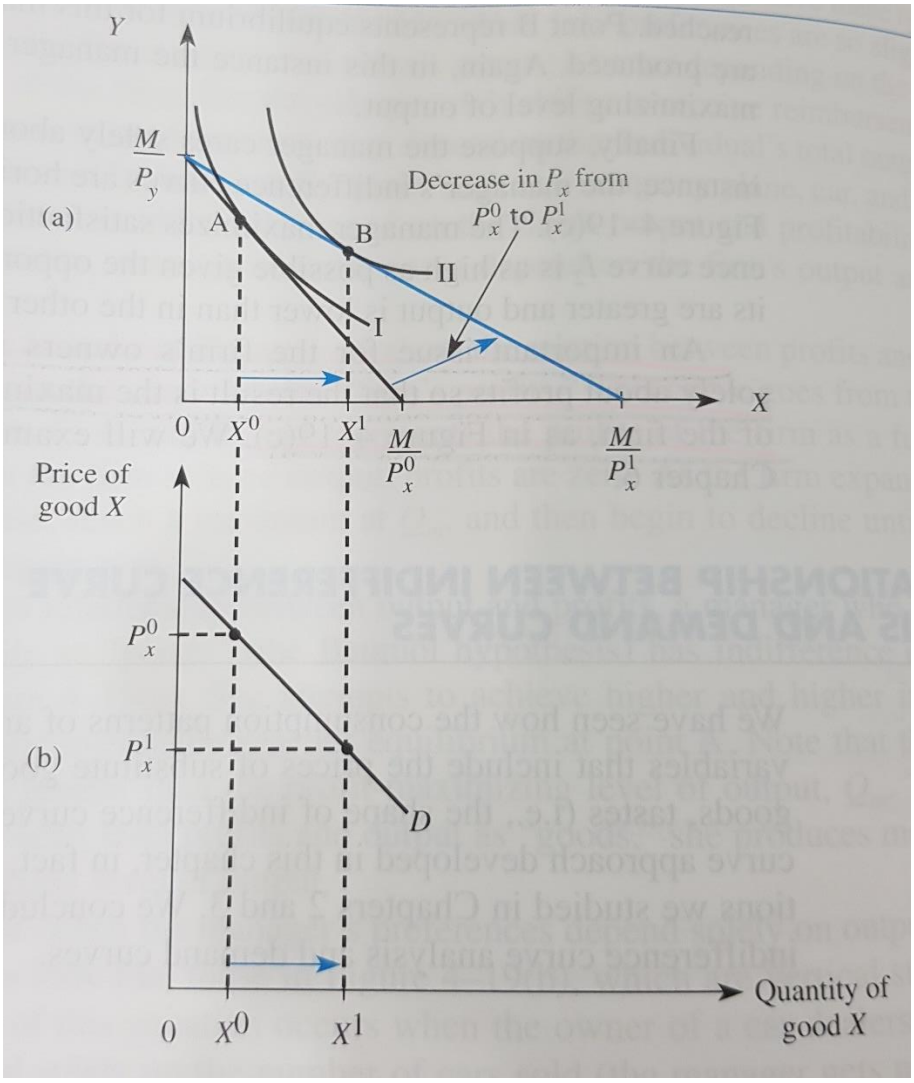
2. Choices by workers and managers
    a. Leisure-income



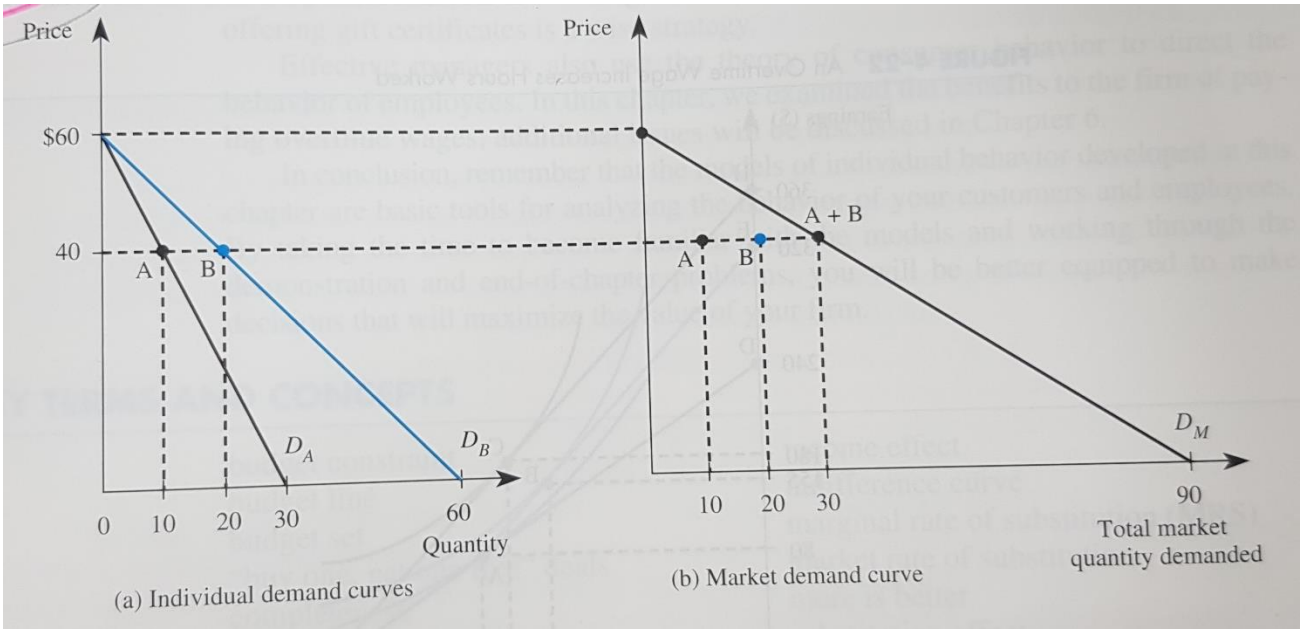
    b. Managers preference



Individual demand



Market demand



Chapter 5: The Production Process and Costs.

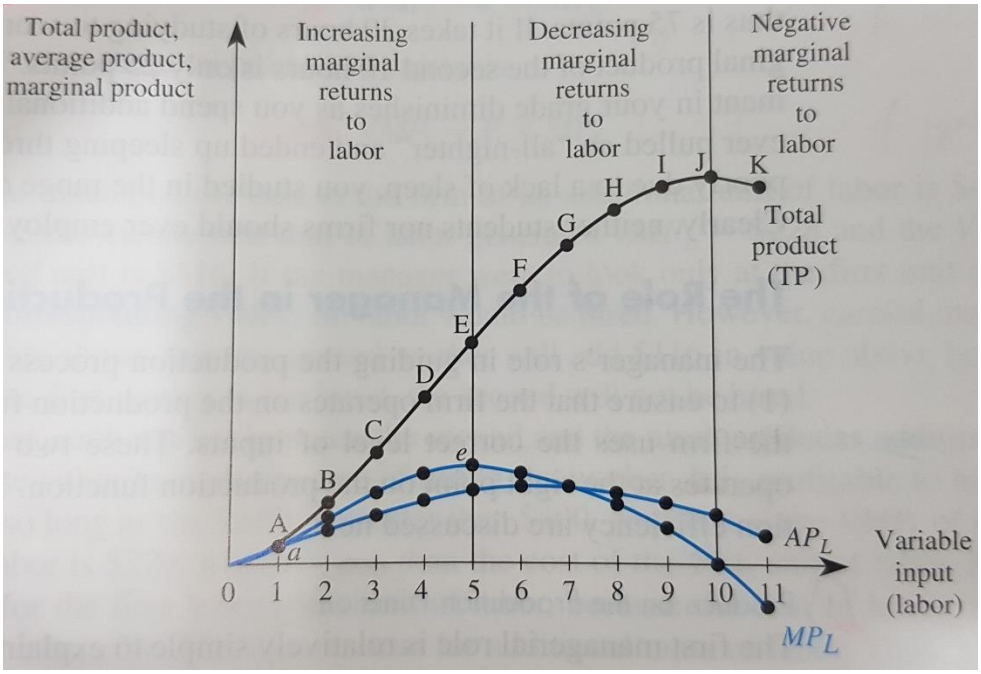
The production function: a function that defines the maximum amount of output that can be produced with a given set of inputs.

$$Q = F(K, L)$$

- **Short run:** the time frame in which there are fixed factors of production.
- **Long run:** the horizon over which the manager can adjust all factors of production.

TABLE 5–1 The Production Function

(1) K^* Fixed Input (Capital) [Given]	(2) L Variable Input (Labor) [Given]	(3) ΔL Change in Labor [Δ(2)]	(4) Q Output [Given]	(5) $\frac{\Delta Q}{\Delta L} = MP_L$ Marginal Product of Labor [Δ(4)/Δ(2)]	(6) $\frac{Q}{L} = AP_L$ Average Product of Labor [(4)/(2)]
2	0	—	0	—	—
2	1	1	76	76	76
2	2	1	248	172	124
2	3	1	492	244	164
2	4	1	784	292	196
2	5	1	1,100	316	220
2	6	1	1,416	316	236
2	7	1	1,708	292	244
2	8	1	1,952	244	244
2	9	1	2,124	172	236
2	10	1	2,200	76	220
2	11	1	2,156	−44	196



- Average product of labor

$$AP_L = \frac{Q}{L}$$

- Average product of capital

$$AP_K = \frac{Q}{K}$$

- Marginal product of labor

$$MP_L = \frac{\Delta Q}{\Delta L}$$

- Marginal product of capital

$$MP_K = \frac{\Delta Q}{\Delta K}$$

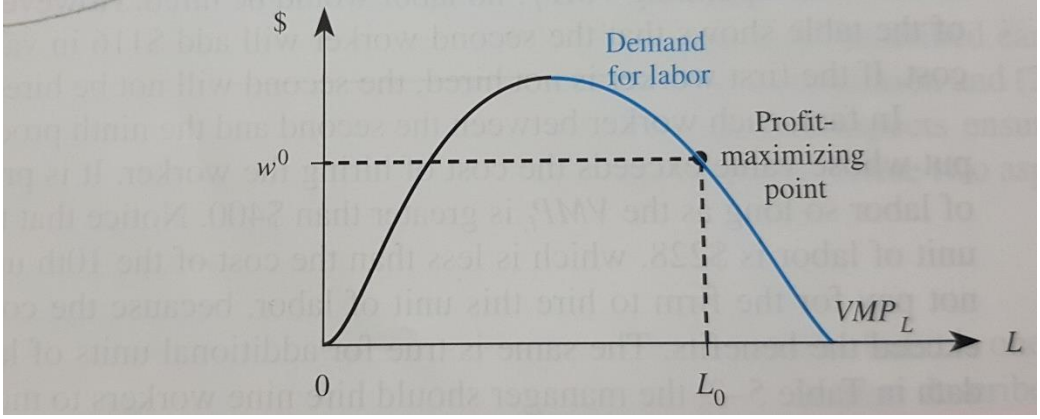
The role of the manager in the production process is to:

1. Produce on the production function (i.e., maximum possible production)
2. Use the right level of inputs (i.e., to reach the profit maximizing point)

TABLE 5–2 The Value Marginal Product of Labor

(1) L Variable Input (Labor) [Given]	(2) P Price of Output [Given]	(3) $\frac{\Delta Q}{\Delta L} = MP_L$ Marginal Product of Labor [Column 5 of Table 5–1]	(4) $VMP_L = P \times MP_L$ Value Marginal Product of Labor [(2) × (3)]	(5) W Unit Cost of Labor [Given]
0	$3	—	—	$400
1	3	76	$228	400
2	3	172	516	400
3	3	244	732	400
4	3	292	876	400
5	3	316	948	400
6	3	316	948	400
7	3	292	876	400
8	3	244	732	400
9	3	172	516	400
10	3	76	228	400
11	3	−44	−132	400

FIGURE 5–2 The Demand for Labor



- Value marginal product pf labor

$$VMP_L = P \times MP_L$$

- Value marginal product of capital

$$VMP_K = P \times MP_K$$

Algebraic forms of production functions:

1. The linear production function

$$Q = F(K, L) = aK + bL$$

$$MP_K = a$$

$$MP_L = b$$

2. The Leontief production function

$$Q = F(K, L) = \min \{aK, bL\}$$

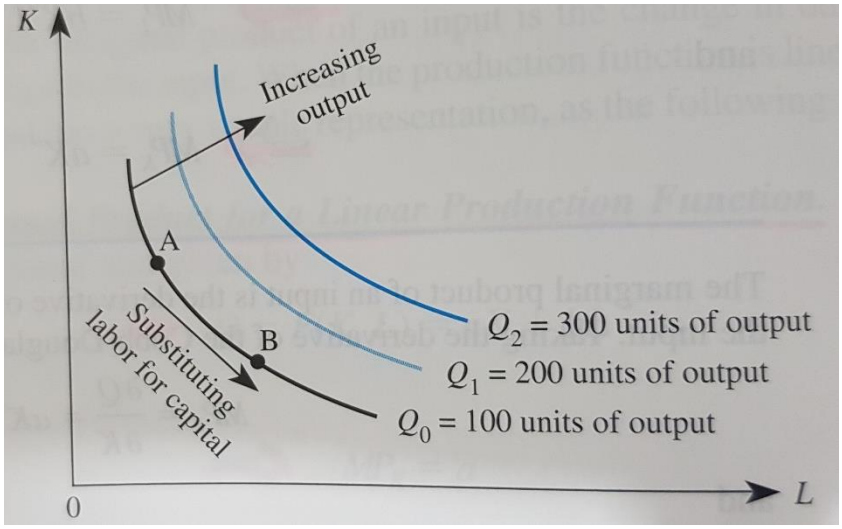
3. The Cobb-Douglas production function

$$Q = F(K, L) = K^a L^b$$

$$MP_L = bK^a L^{b-1}$$

$$MP_K = aK^{a-1} L^b$$

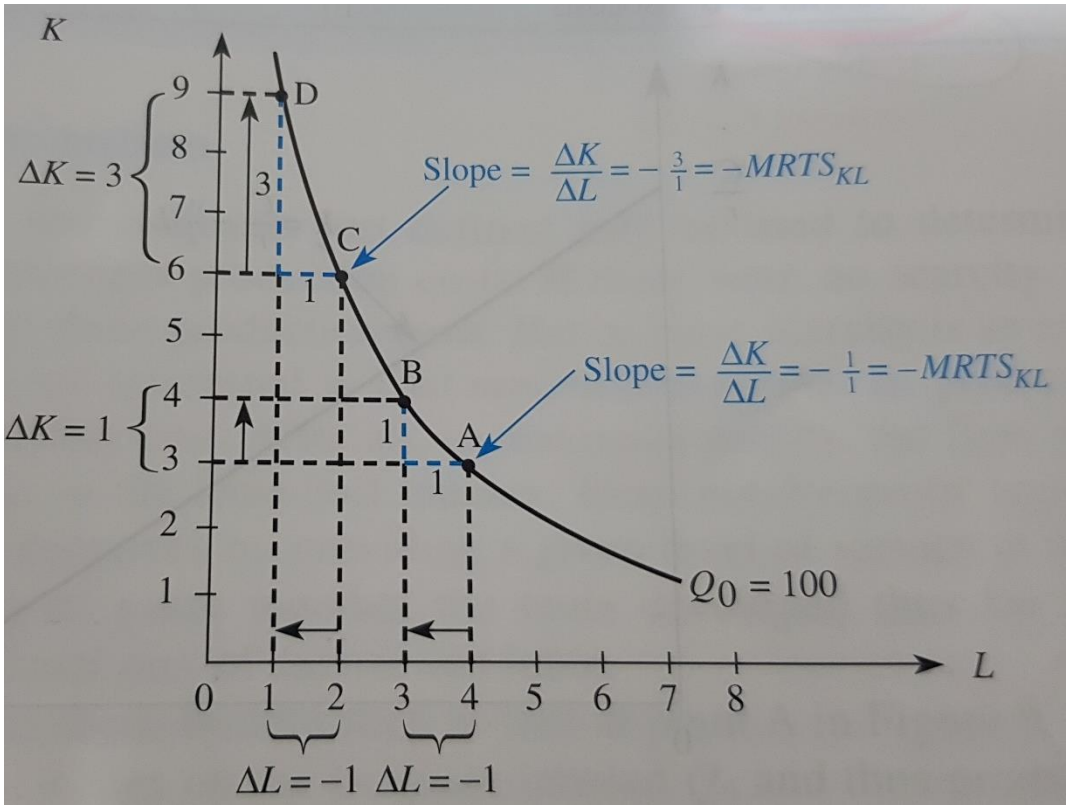
Isoquant: the combinations of input that yields the same level of output.



- Marginal rate of technical substitution

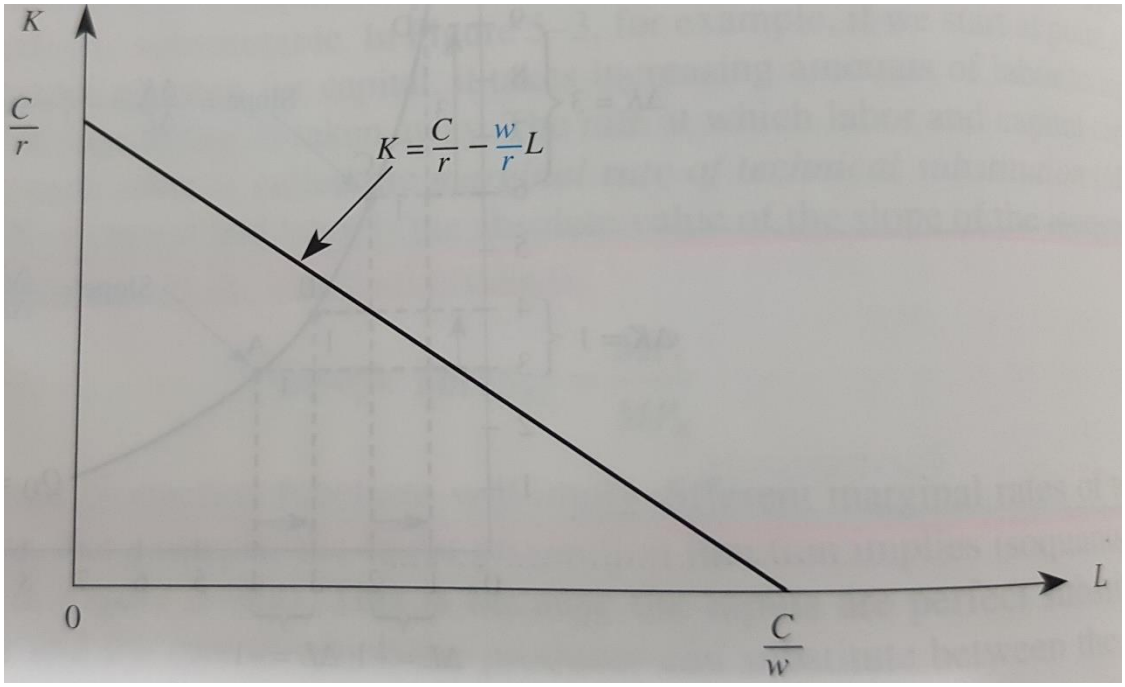
$$MRTS_{KL} = \frac{MP_L}{MP_K}$$

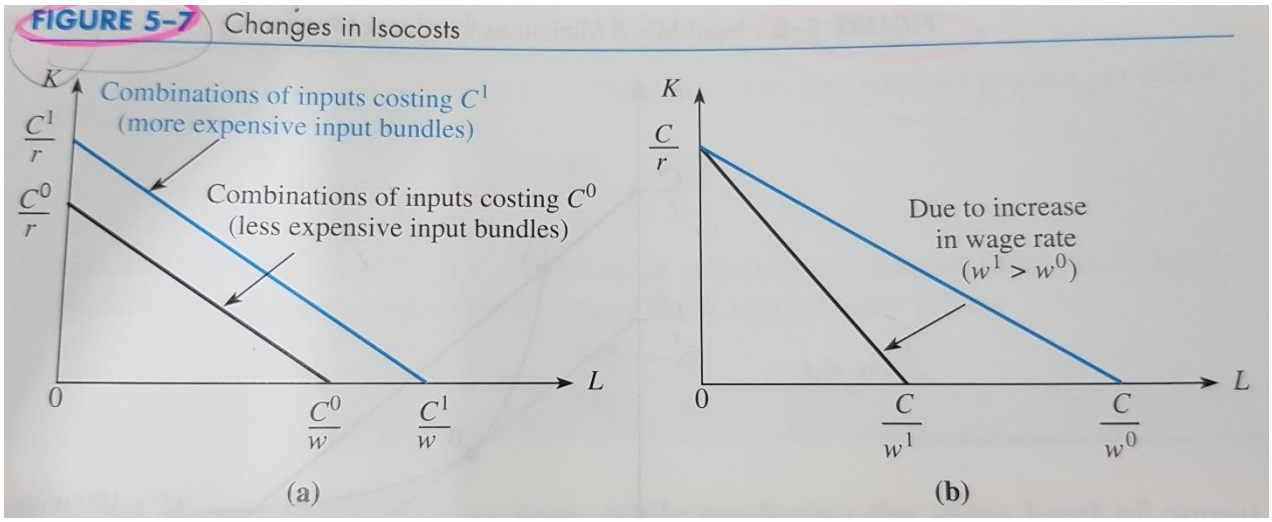
- Law of diminishing marginal rate of technical substitution



Isocost: the combinations of input that yields the same level of cost.

$$wL + rK = C$$





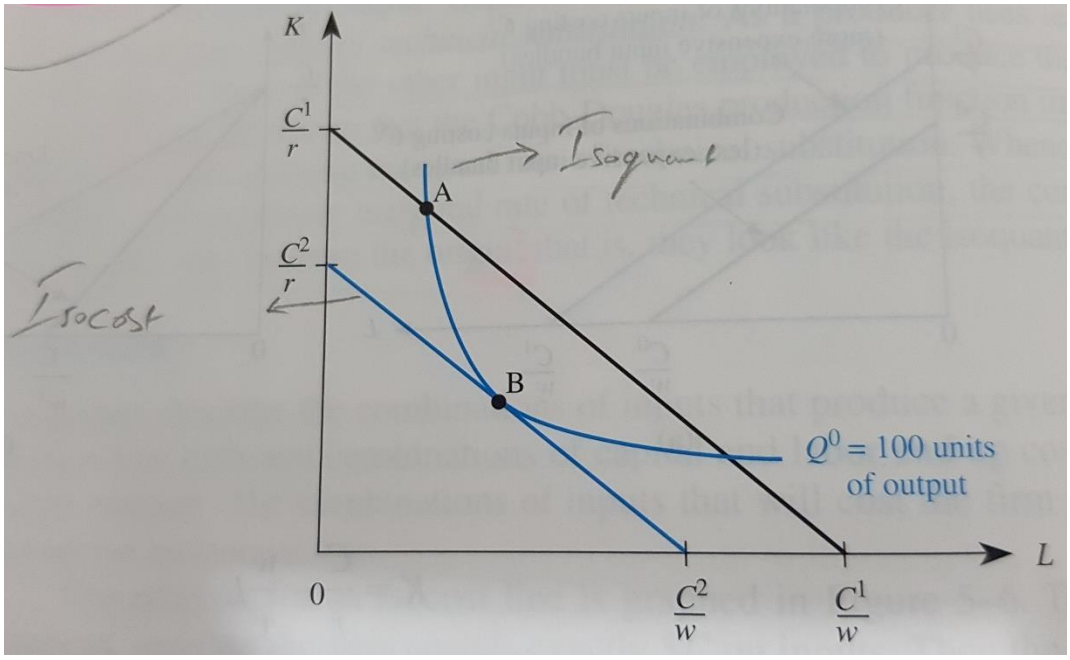
Cost-Minimizing Input Rule

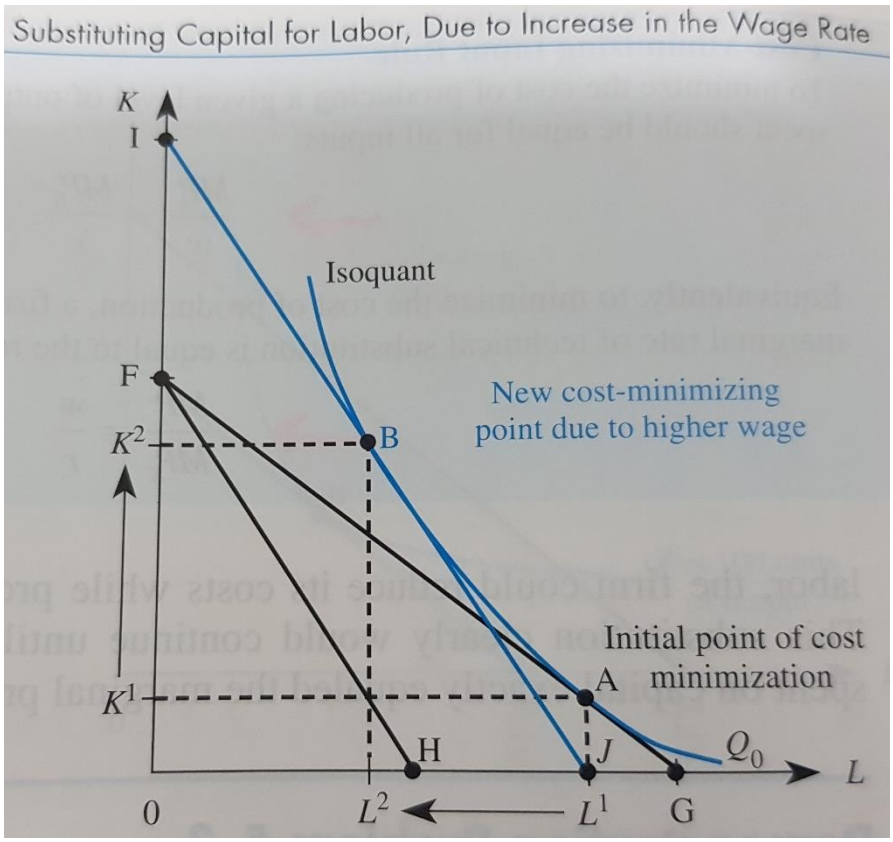
To minimize the cost of producing a given level of output, the marginal product per dollar spent should be equal for all inputs:

$$\frac{MP_L}{w} = \frac{MP_K}{r}$$

Equivalently, to minimize the cost of production, a firm should employ inputs such that the marginal rate of technical substitution is equal to the ratio of input prices:

$$\frac{MP_L}{MP_K} = \frac{w}{r}$$




Substituting Capital for Labor, Due to Increase in the Wage Rate
K
I
Isoquant
F
New cost-minimizing point due to higher wage
K^2
B
Initial point of cost minimization
A
K^1
H
J
Q_0
L
0
L^2
L^1
G

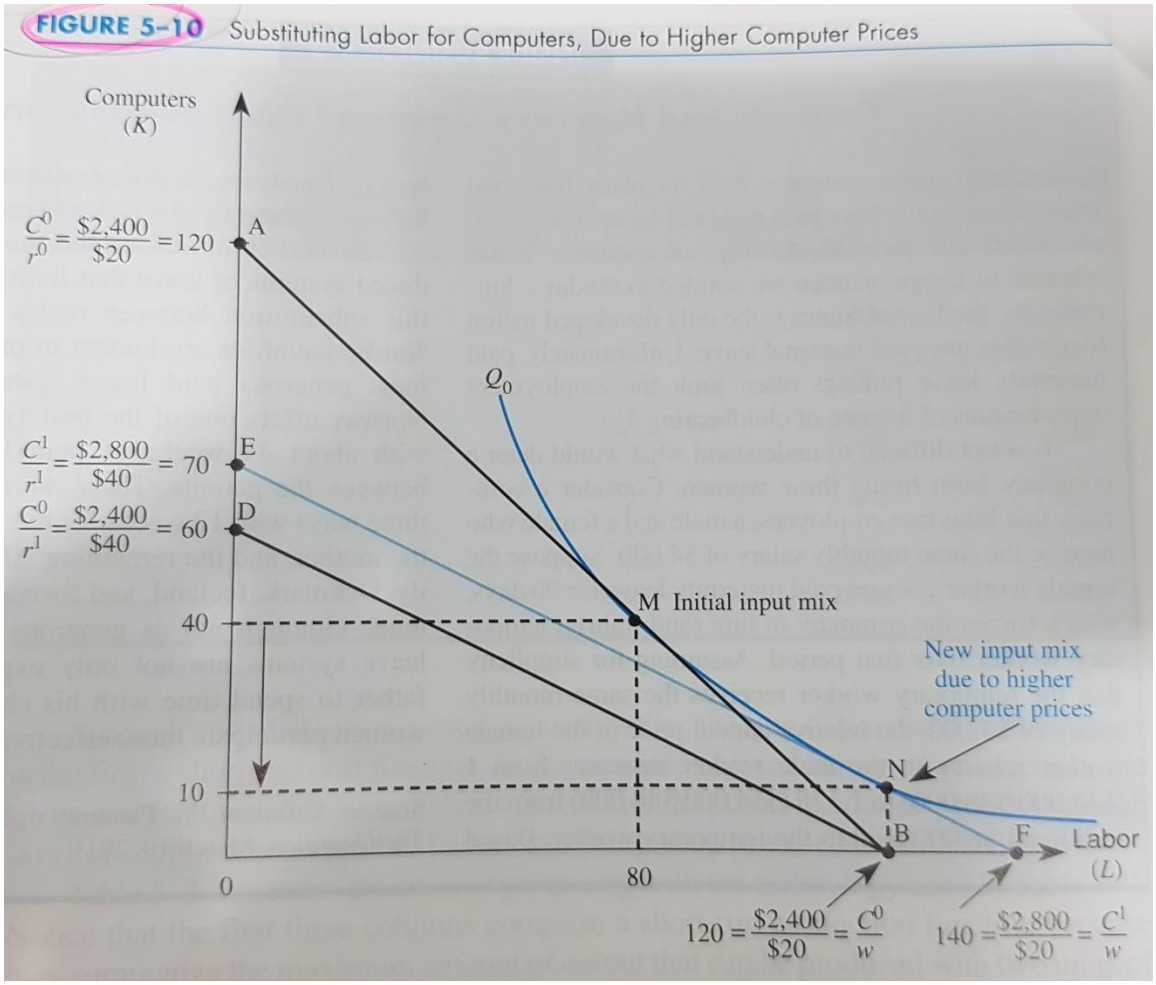
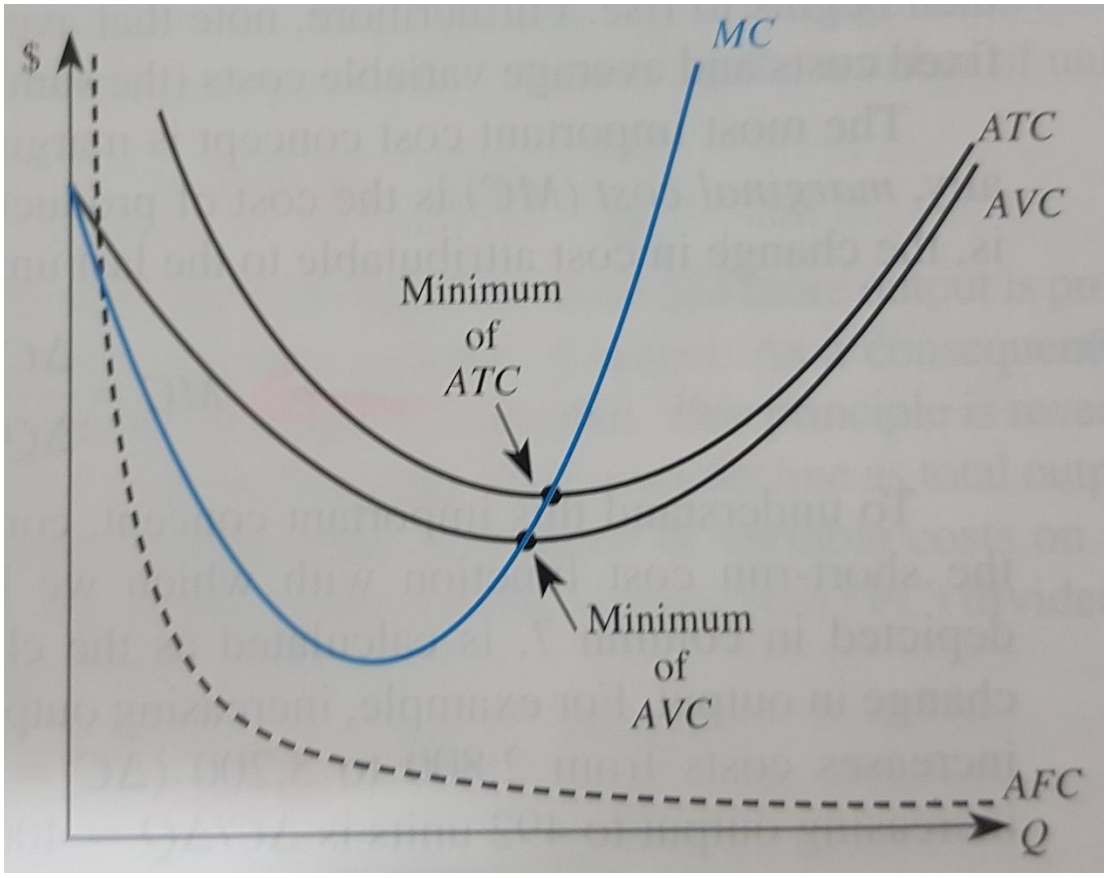


FIGURE 5-10 Substituting Labor for Computers, Due to Higher Computer Prices
Computers (K)
$\frac{C^0}{r^0} = \frac{\$2,400}{\$20} = 120$
A
Q_0
$\frac{C^1}{r^1} = \frac{\$2,800}{\$40} = 70$
E
$\frac{C^0}{r^1} = \frac{\$2,400}{\$40} = 60$
D
M Initial input mix
40
New input mix due to higher computer prices
N
10
B
F
Labor (L)
0
80
$120 = \frac{\$2,400}{\$20} = \frac{C^0}{w}$
$140 = \frac{\$2,800}{\$20} = \frac{C^1}{w}$

Different types of cost:



- Total cost

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

- Average fixed cost

$$AFC = \frac{FC}{Q}$$

- Average variable cost

$$AVC = \frac{VC(Q)}{Q}$$

- Average total cost

$$ATC = \frac{C(Q)}{Q}$$

$$ATC = AVC + AFC$$

- Marginal cost

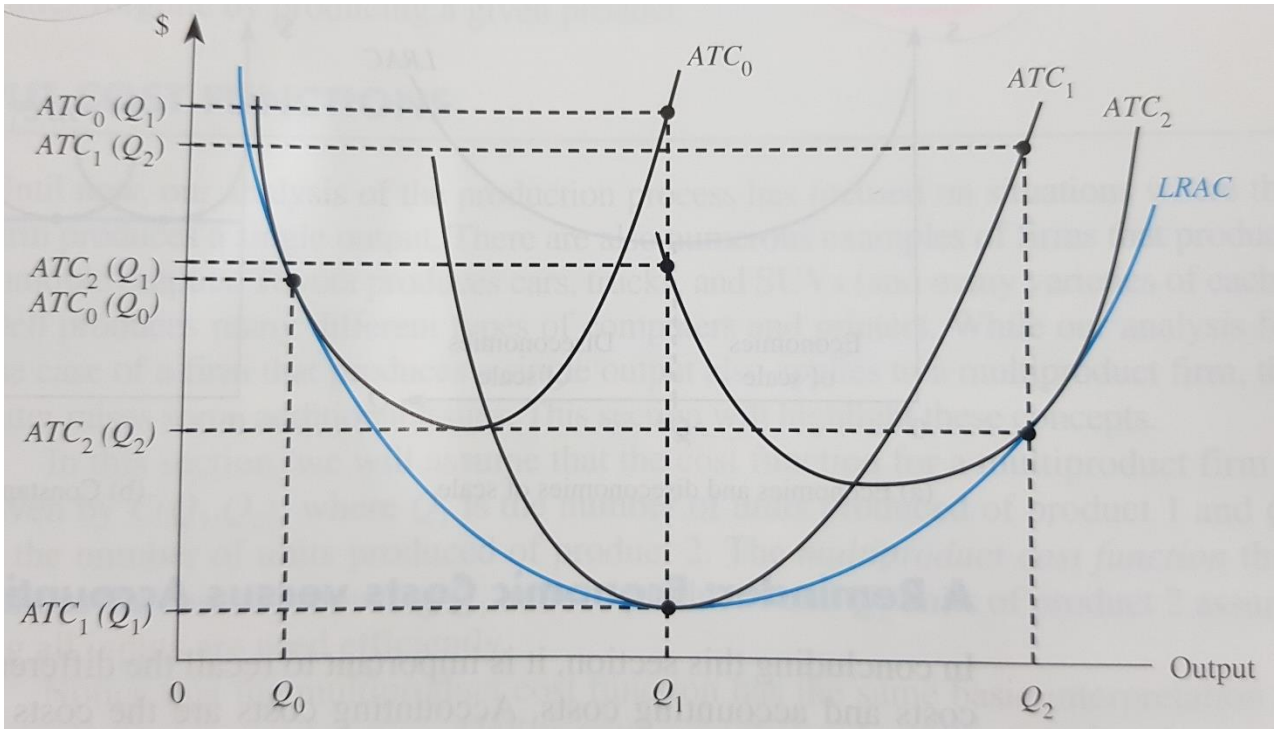
$$MC = \frac{\Delta C}{\Delta Q}$$

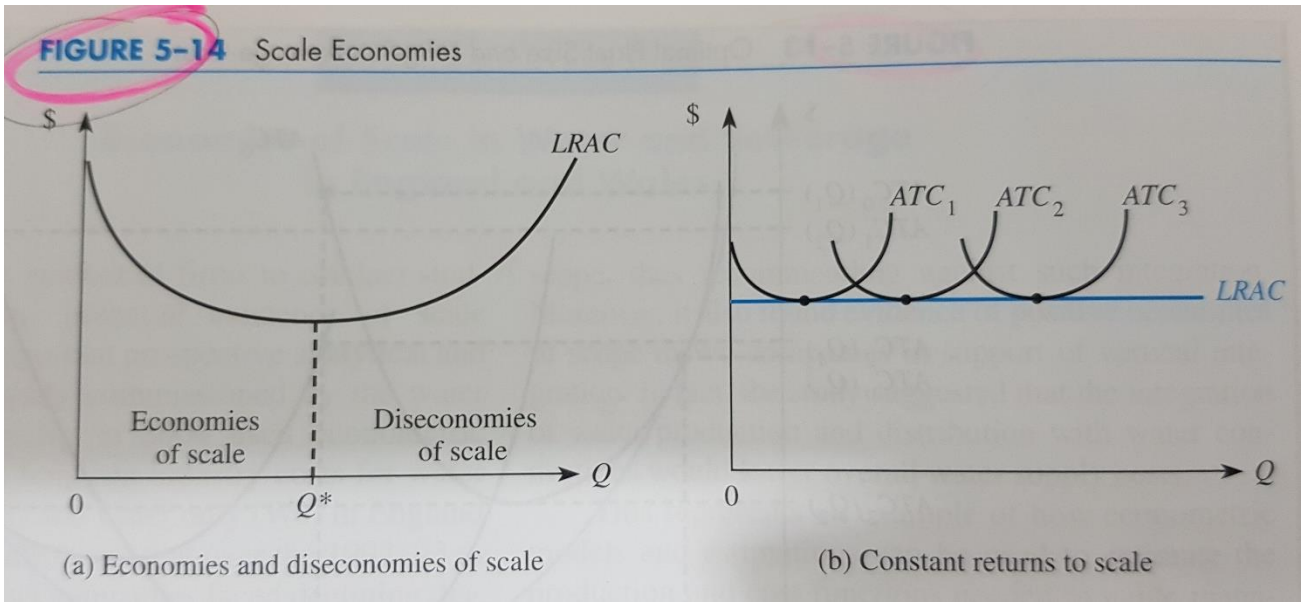
Cubic cost function:

$$C(Q) = f + aQ + bQ^2 + cQ^3$$

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

Long-run average cost curve: a curve that defines the minimum average cost of producing alternative levels of output, allowing for optimal selection of both fixed and variable factors of production.





The multi-product cost function:

- Economies of scope: the total cost of producing two types of outputs together is less than the total cost of producing each type of output separately.

$$C(Q_1, 0) + C(0, Q_2) > C(Q_1, Q_2)$$

- Cost complementarity: the marginal cost of producing one type of output decreases when the output of another good is increased.

$$\frac{\Delta MC_1(Q_1, Q_2)}{\Delta Q_2} < 0$$

Summary of the Properties of the Quadratic Multiproduct Cost Function. multiproduct cost function $C(Q_1, Q_2) = f + aQ_1Q_2 + (Q_1)^2 + (Q_2)^2$

1. Exhibits cost complementarity whenever $a < 0$.
2. Exhibits economies of scope whenever $f - aQ_1Q_2 > 0$.

Chapter 7: The Nature of Industry.

Market structure:

1. Firm size
2. Industry concentration
    a. Four-firm concentration ratio

Let S_1, S_2, S_3, and S_4 denote the sales of the four largest firms in an industry, and let S_T denote the total sales of all firms in the industry. The four-firm concentration ratio is given by

$$C_4 = \frac{S_1 + S_2 + S_3 + S_4}{S_T}$$

Equivalently, the four-firm concentration ratio is the sum of the market shares of the top four firms:

$$C_4 = w_1 + w_2 + w_3 + w_4$$

where

$w_1 = S_1/S_T$,
$w_2 = S_2/S_T$,
$w_3 = S_3/S_T$, and
$w_4 = S_4/S_T$

    b. Herfindahl-Hirschman index (HHI)

$$\text{HHI} = 10{,}000\ \Sigma w_i^2$$

    c. Limitations of concentration measures
        i. Global markets (doesn't factor in imports)
        ii. National, regional, and local markets
        iii. Industry definitions and product classes
3. Technology (labor vs. capital intensive industries)
4. Demand and market conditions
    a. Low vs. high demand industries
    b. Information accessibility
    c. Elasticity differences
        i. Between different industries
        ii. Between a firm and the industry
            1. Rothschild index

$$R = \frac{E_T}{E_F}$$

5. Potential for entry

Market conduct:

1. Pricing behavior
    a. Lerner index

$$L = \frac{P - MC}{P}$$

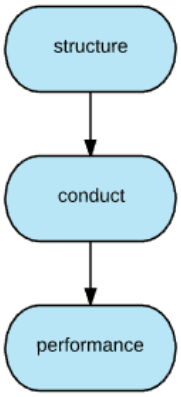
2. Integration and merger activity
    a. Vertical integration
    b. Horizontal integration
    c. Conglomerate mergers
3. Research and development (depends on the industry)
4. Advertising (depends on the industry)

Market performance:

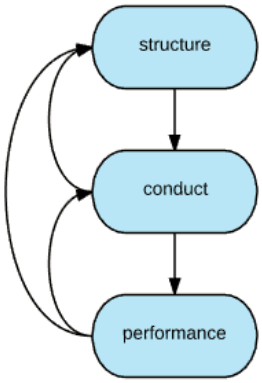
1. Profits
2. Social welfare
    a. Consumer and producer surplus
    b. Dansby-Willig performance index
        i. 0 == good
        ii. 1 == bad, firms should be forced to produce more

The structure-conduct-performance paradigm:

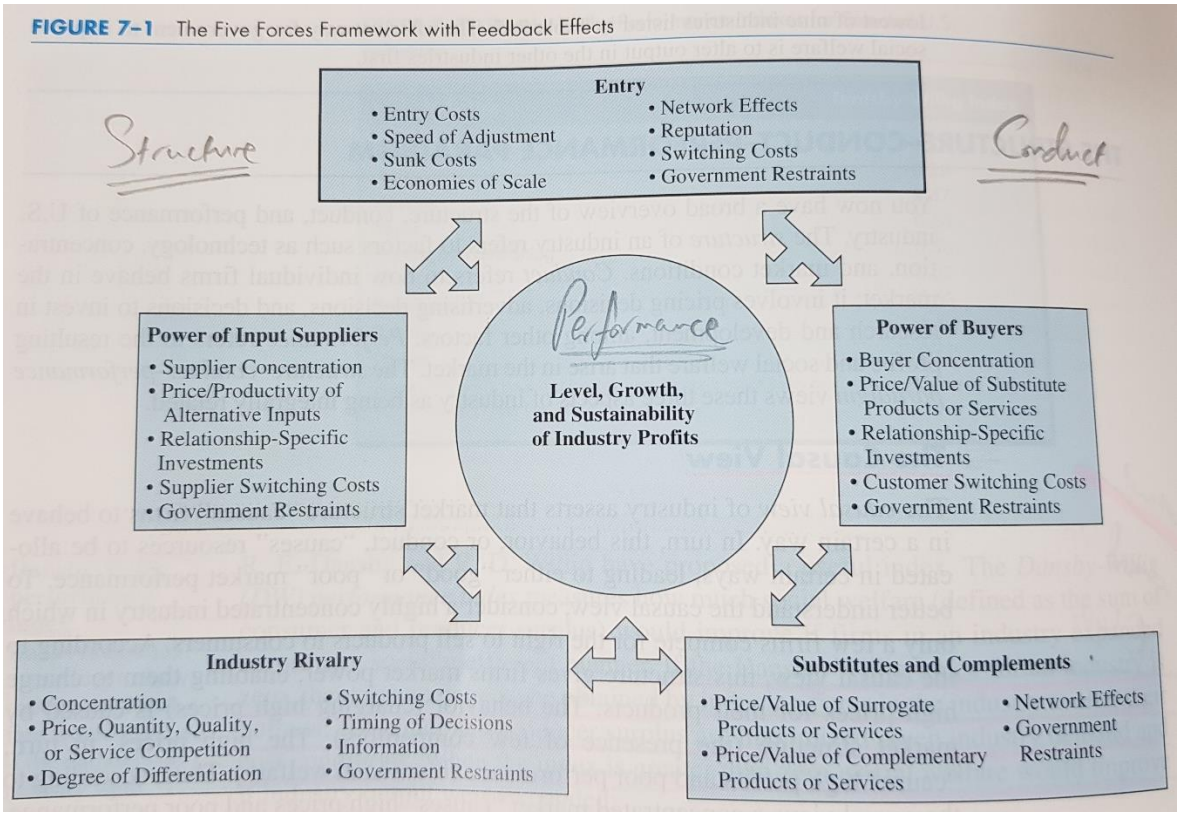
1. The causal view



2. The feedback critique



3. Relation to the five forces framework



Types of market structures:

1. Perfect competition (C4 equals 0)
2. Monopolistic competition (C4 is closer to 0)
3. Oligopoly (C4 is closer to 1)
4. Monopoly (C4 equals 1)

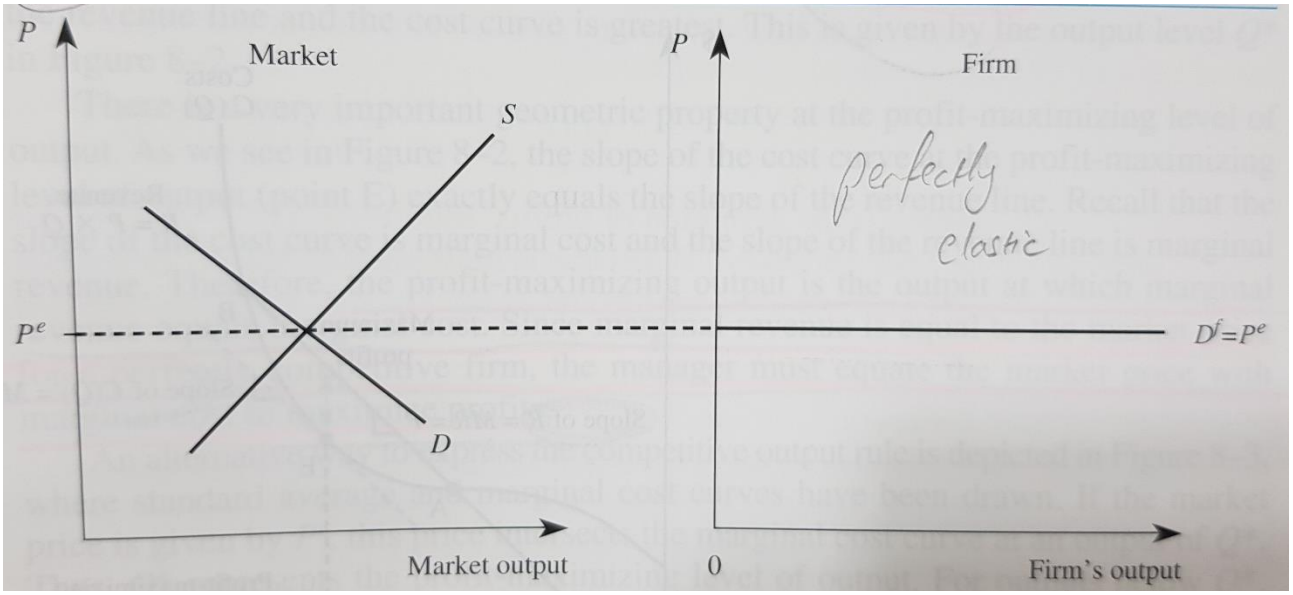
Chapter 8: Managing in Competitive, Monopolistic, and Monopolistically Competitive Markets.

Perfect competition

Perfectly competitive market:

1. Many buyers and sellers
2. Homogenous product
3. Unrestricted access to information
4. No transaction costs
5. Free entry / exist

Demand for the market and the firm:



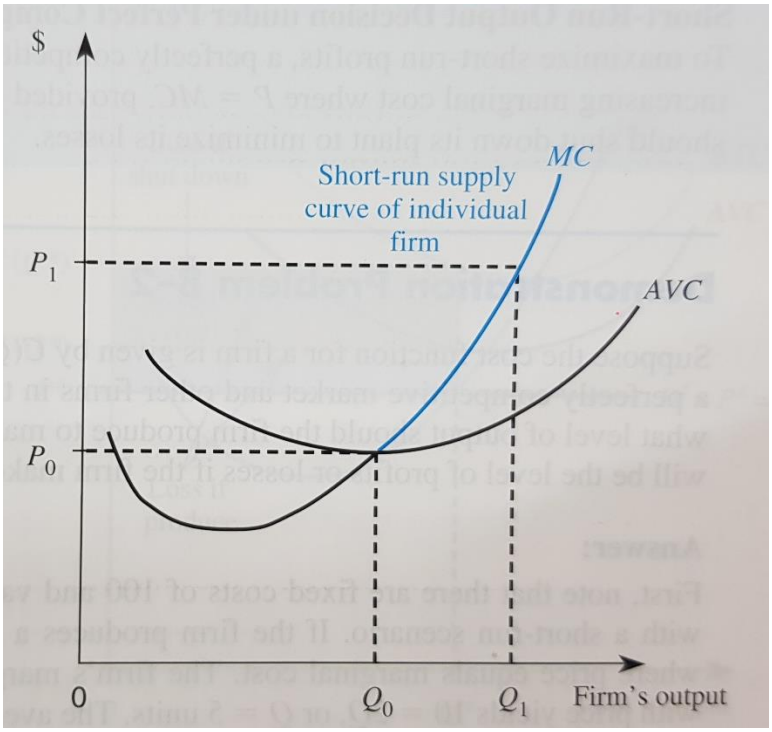
Losses decisions:

Short-Run Output Decision under Perfect Competition
To maximize short-run profits, a perfectly competitive firm should produce in the range of increasing marginal cost where $P = MC$, provided that $P \geq AVC$. If $P < AVC$, the firm should shut down its plant to minimize its losses.

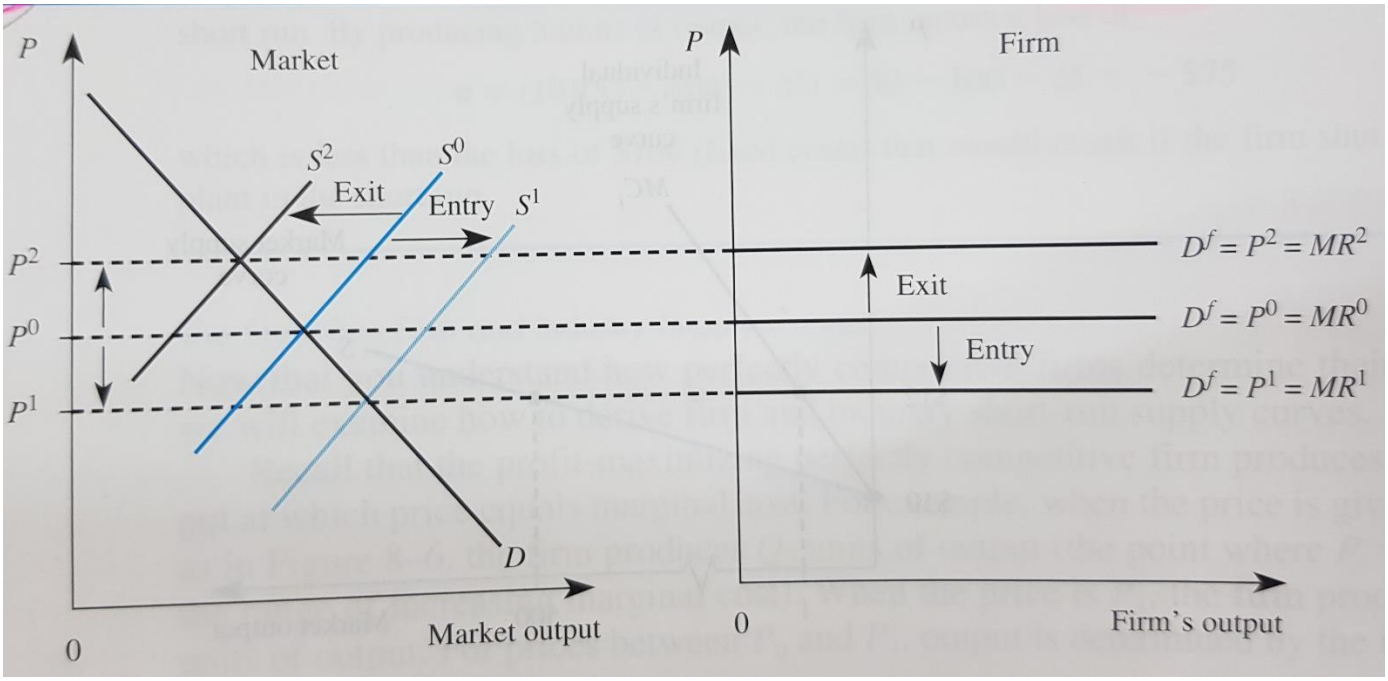
Note: Firm supply = market price = MR

Short-run supply decisions:

The Firm's Short-Run Supply Curve
The short-run supply curve for a perfectly competitive firm is its marginal cost curve above the minimum point on the *AVC* curve, as illustrated in Figure 8–6.



Affects of entry / exit on a perfect competition market:

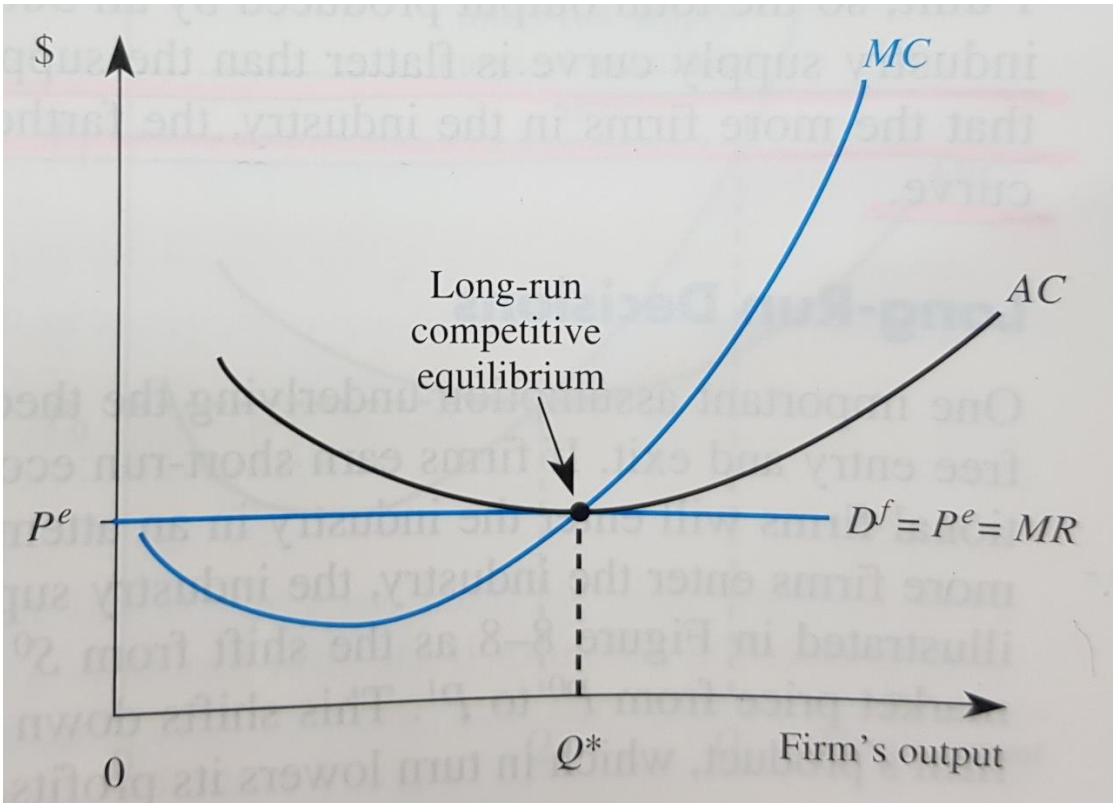


Long-run supply decisions:

Long-Run Competitive Equilibrium

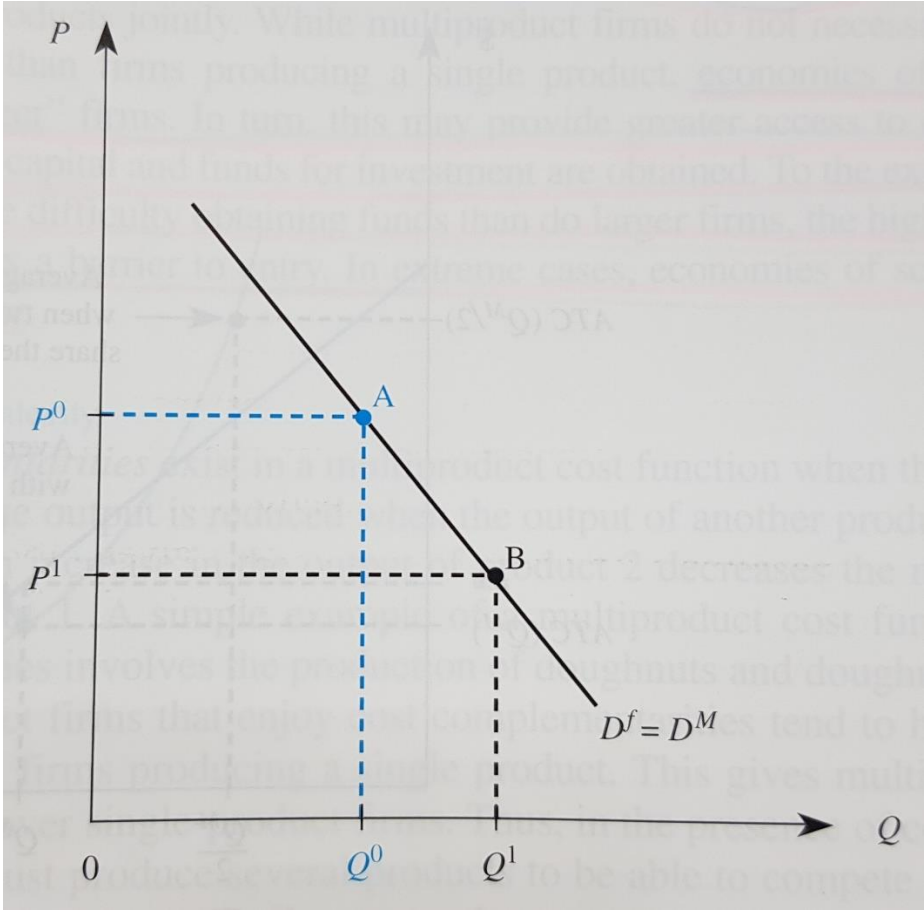
In the long run, perfectly competitive firms produce a level of output such that

1. $P = MC$
2. $P =$ minimum of AC



Monopoly

Demand curve for a monopolistic firm:



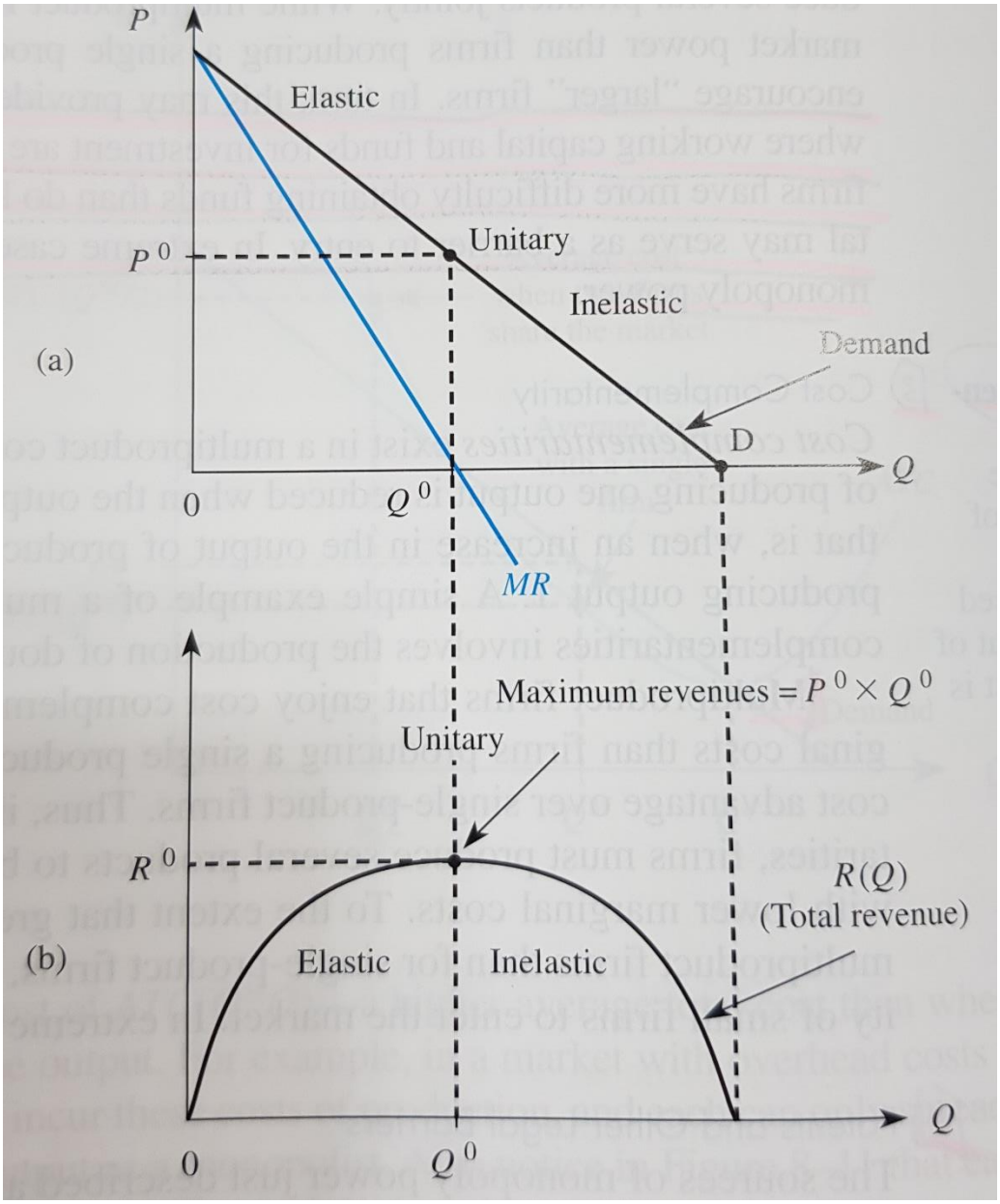
Notes:

- Market demand curve = firm demand curve
- There is no supply curve for a monopoly

Sources of monopoly power:

1. Economies of scale
2. Economies of scope
3. Cost complementarities
4. Patens and other legal barriers

Maximizing revenue:



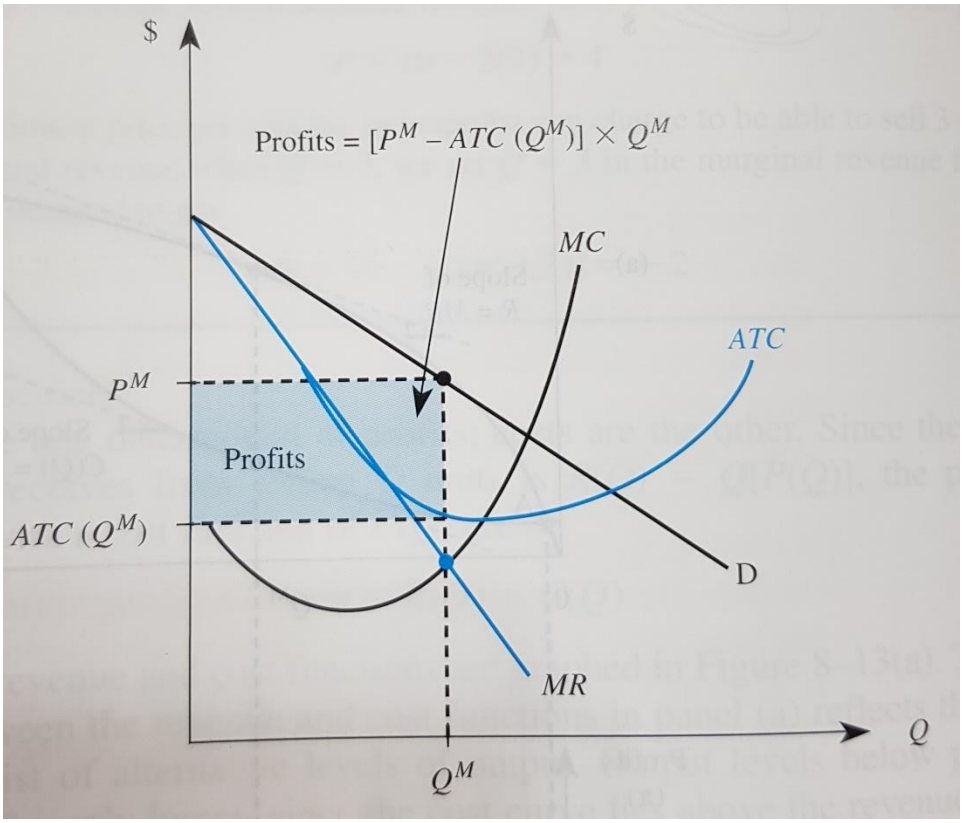
Marginal revenue:

$$MR = P\left[\frac{1+E}{E}\right]$$

$$MR = a + 2bQ$$

Maximizing profit:

$$MR(Q^M) = MC(Q^M)$$



Monopoly Pricing Rule

Given the level of output, Q^M, that maximizes profits, the monopoly price is the price on the demand curve corresponding to the Q^M units produced:

$$P^M = P(Q^M)$$

Multi-plant decisions:

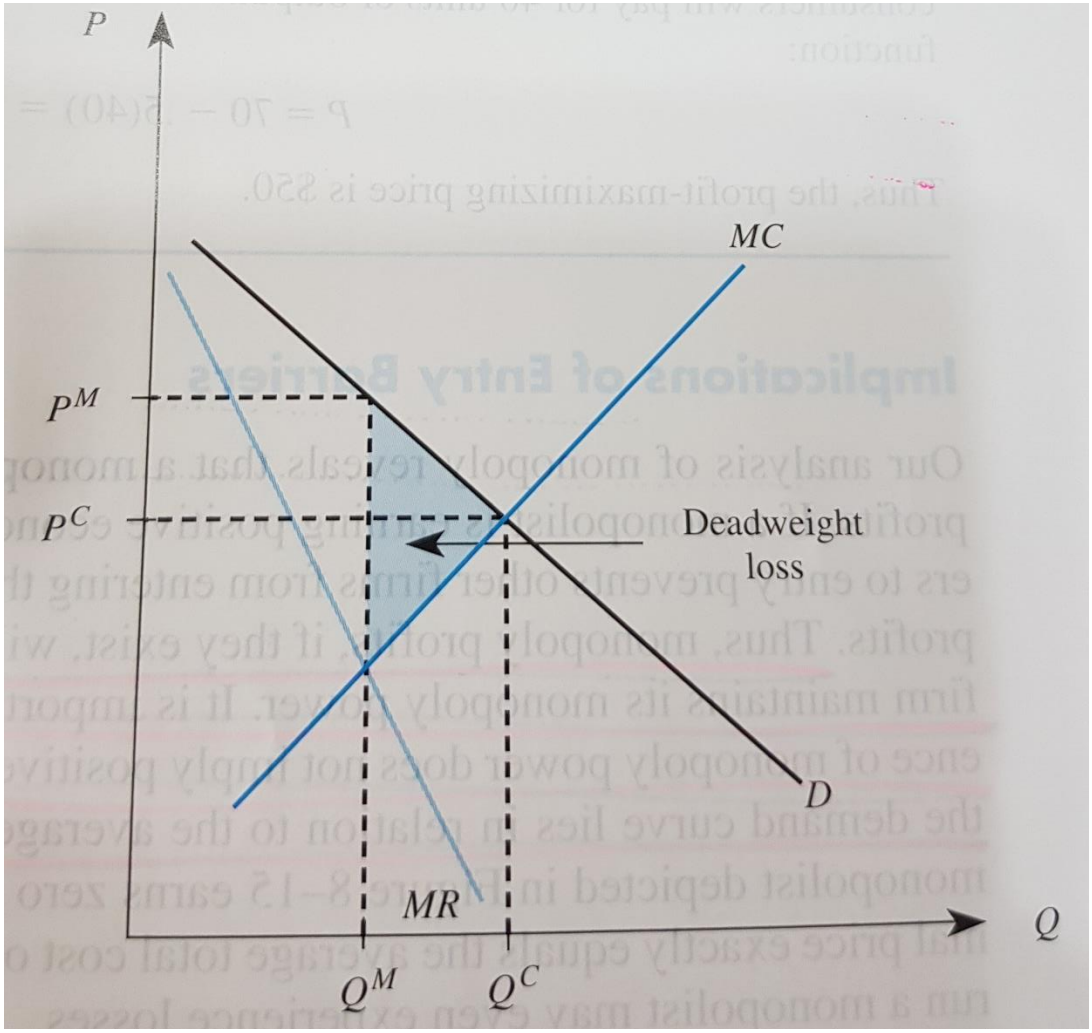
Multiplant Output Rule

Let $MR(Q)$ be the marginal revenue of producing a total of $Q = Q_1 + Q_2$ units of output. Suppose the marginal cost of producing Q_1 units of output in plant 1 is $MC_1(Q_1)$ and that of producing Q_2 units in plant 2 is $MC_2(Q_2)$. The profit maximization rule for the two-plant monopolist is to allocate output among the two plants such that

$$MR(Q) = MC_1(Q_1)$$
$$MR(Q) = MC_2(Q_2)$$

$$MC_1(Q_1) = MC_2(Q_2)$$

Deadweight loss of monopoly: the consumer and producer surplus that is lost due to the monopolist charging a price in excess of marginal cost.



Note: price > MR

Monopolistic competition

Monopolistically competitive market:

1. Many buyers and sellers
2. Each firm produces a differentiated product
3. Free entry / exit

Note: it lies somewhere between perfect competition and a monopoly

Profit maximization:

Profit Maximization Rule for Monopolistic Competition

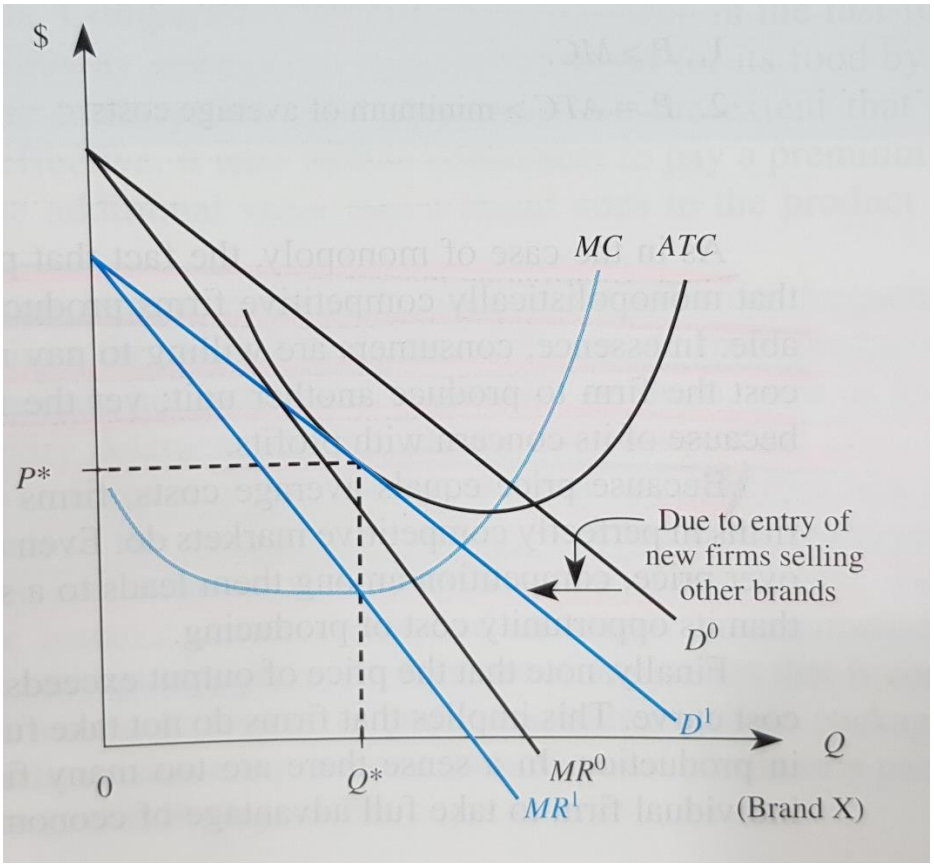
To maximize profits, a monopolistically competitive firm produces where its marginal revenue equals marginal cost. The profit-maximizing price is the maximum price per unit that consumers are willing to pay for the profit-maximizing level of output. In other words, the profit-maximizing output, Q^*, is such that

$$MR(Q^*) = MC(Q^*)$$

and the profit-maximizing price is

$$P^* = P(Q^*)$$

Effect of entry:



The long-run:

The Long Run and Monopolistic Competition

In the long run, monopolistically competitive firms produce a level of output such that

1. $P > MC$.
2. $P = ATC >$ minimum of average costs.

Implications of product differentiation:

1. Spend on advertising
2. Introduce new products
    a. Improved products
    b. Different product line
    c. Niche marketing
3. Avoid becoming a brand myopic company

Optimal advertising decisions:

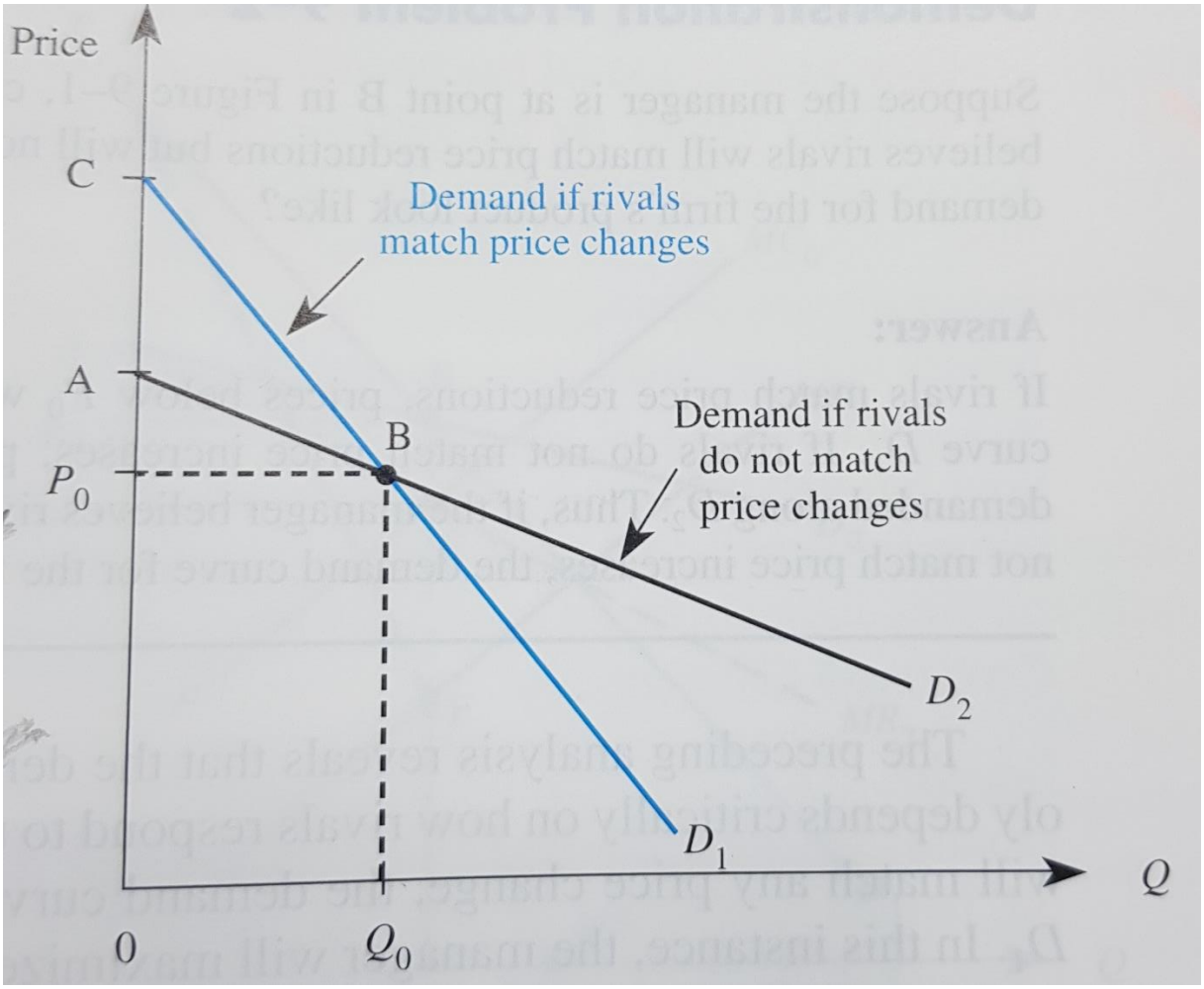
$$\frac{A}{R} = \frac{E_{Q,A}}{-E_{Q,P}}$$

- The more elastic the demand for a firm's product, the lower the optimal advertising to revenue ratio
- The greater the advertising elasticity, the greater the optimal advertising to revenue ratio

Chapter 9: Basic Oligopoly Models.

Oligopoly: a market structure in which there are only a few firms, each of which is large relative to the total industry.

Note: managers do not like to work in an oligopoly because they don't just have to worry about their decisions, they also have to worry about the impact of their decisions on rival firms.



Notes:

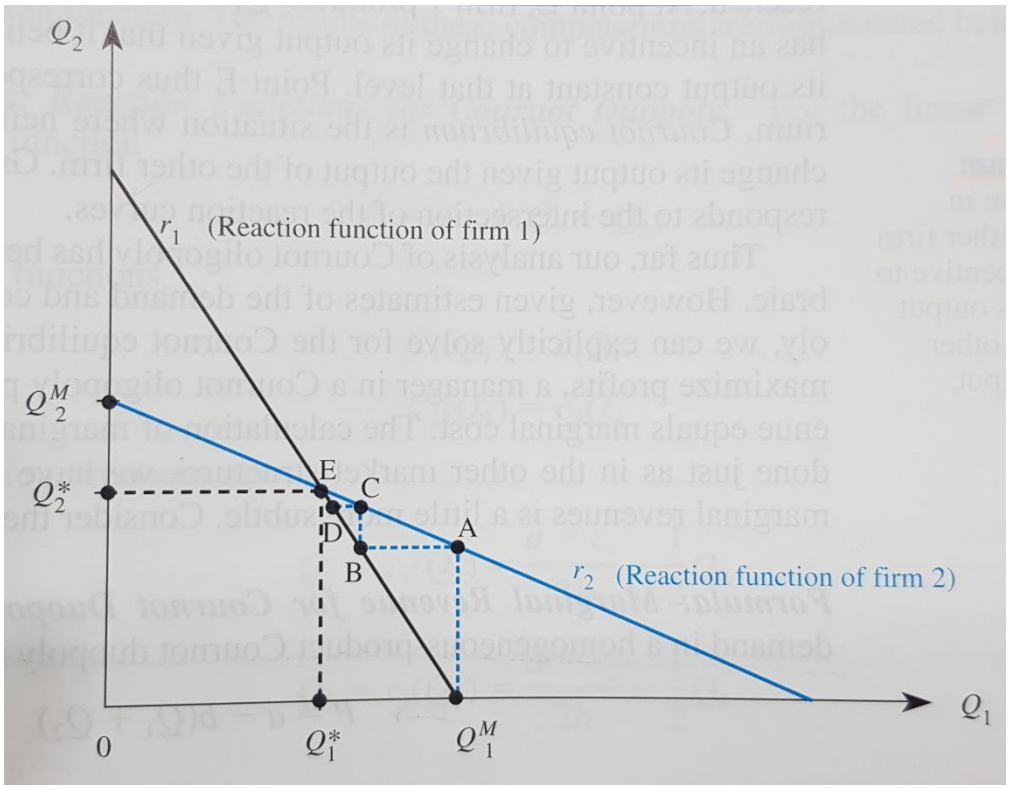
- If the manager decrease price
  - And rivals decrease price → same demand curve
  - And rivals keep prices as is → different demand curve
- If the manager increases price
  - And rivals increase price → same demand curve
  - And rivals keep prices as is → different demand curve

Oligopoly models:

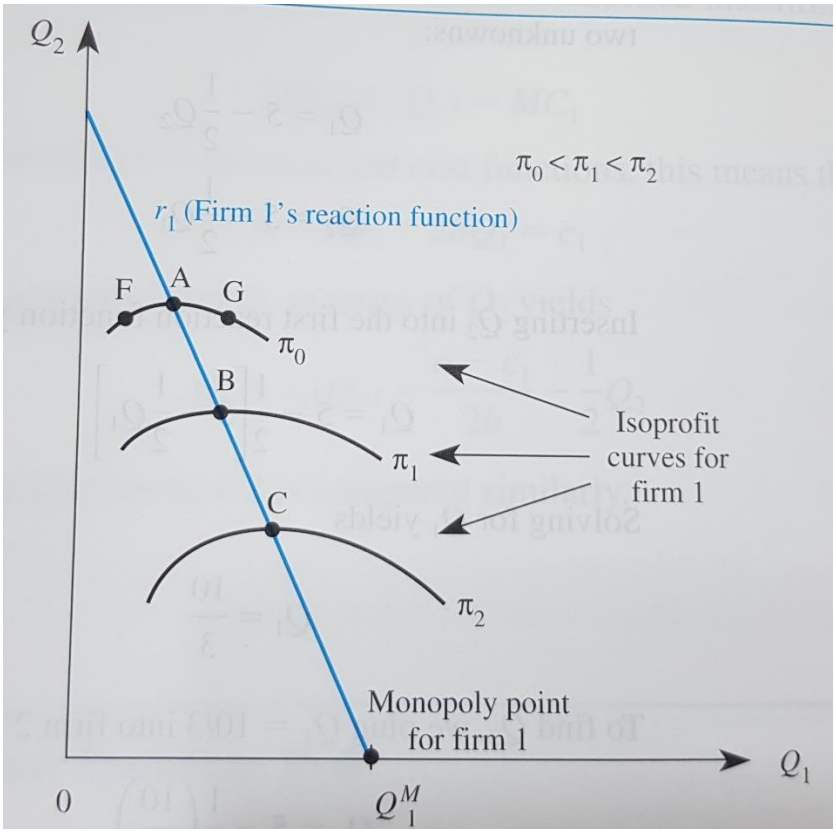
1. **Sweezy oligopoly**
   1.1. Few firms serving many consumers
   1.2. Firms produce differentiated products
   1.3. Each firm believes rivals will respond to a price reduction but will not follow a price increase
   1.4. Barriers to entry exist

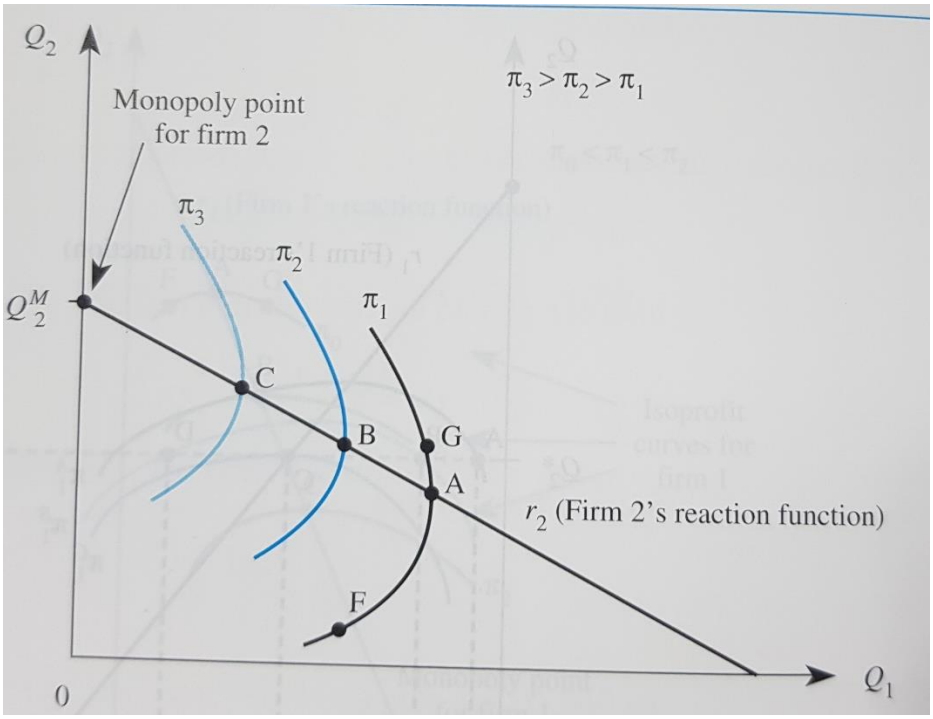
2. **Cournot oligopoly**
   2.1. There are few firms serving many consumers
   2.2. Firms produce either differentiated or homogeneous products
   2.3. Each firm believes rivals will hold their output constant if it changes its output
   2.4. Barriers to entry exist

- Deadweight loss exists
- Best response / reaction function
  - A function that defines the profit maximizing level of output for a firm for given output levels of another firm

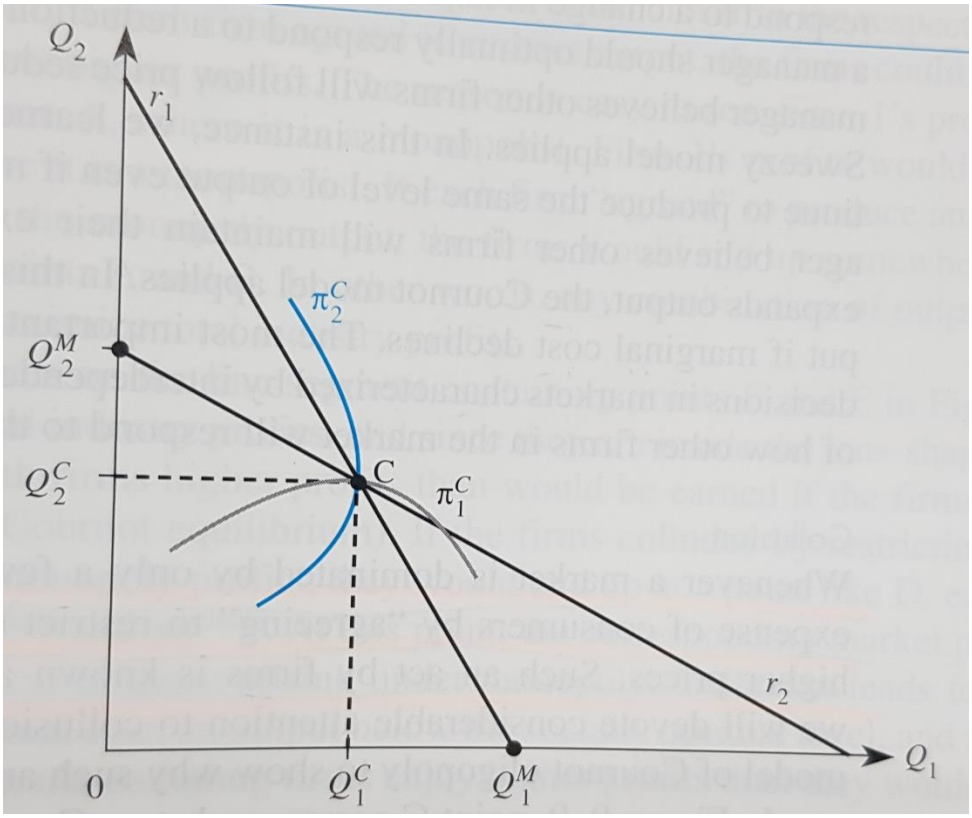


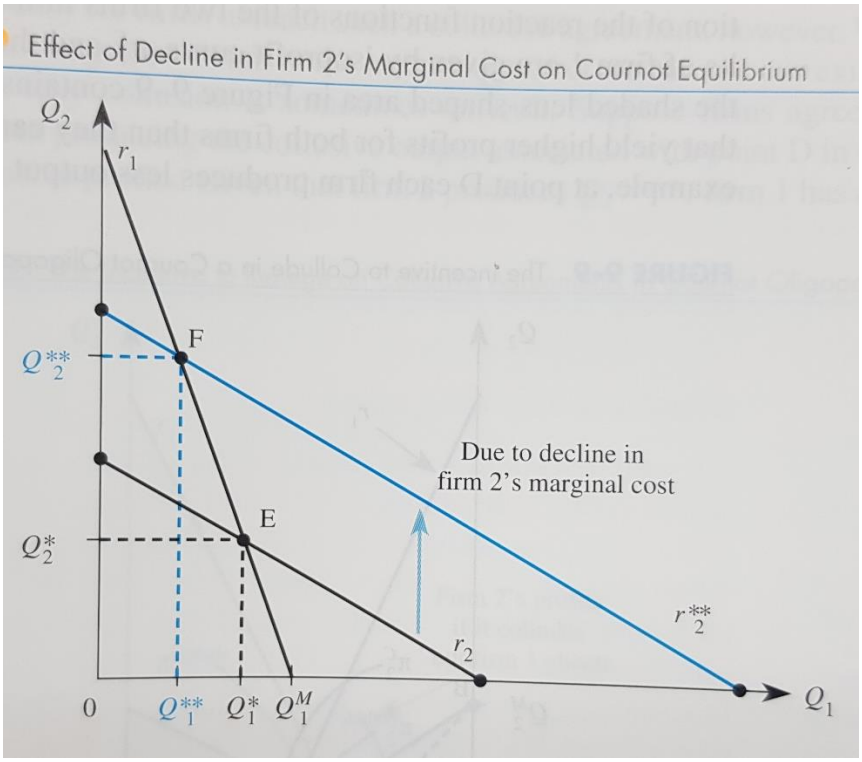
- Isoprofit curve
  - Each point on a curve has the same level of profit
  - The lower the curve (i.e., closer to the firm monopoly point) the higher the profits
  - The peak of a curve is when it intersects with its own reaction curve
  - Isoprofit curves do not intersect with one another





- Cournot equilibrium
    - A situation in which neither firm has an incentive to change its output given the other firm's output





3. Collusion

3.1. Few firms dominate the market

3.2. Firms benefit at the expense of consumers by agreeing to restrict output / charge higher prices

4. Stakelberg oligopoly

4.1. Few firms serving many consumers
4.2. Firms produce either homogeneous or differentiated products
4.3. The leader chooses an output before rivals select their outputs
4.4. The followers take the leader's output as given and select outputs that maximize profits given the leader's output
4.5. Barriers to entry exist

- Deadweight loss exists
- The leader does not take the followers' outputs as given but instead chooses an output that maximizes profits given that each follower will react to this output decision according to a Cournot reaction function

5. Bertrand oligopoly

5.1. Few firms serving many consumers
5.2. Firms produce identical products at a constant marginal cost
5.3. Firms compete in price and react optimally to competitors' prices
5.4. Consumers have perfect information and there are no transaction costs
5.5. Barriers to entry exist

- No deadweight loss
- This oligopoly is undesirable as it leads to zero economic profits
- Mitigating the Bertrand trap
    - Raise switching costs on the customer
    - Eliminate the perception that the firms' products are identical

Oligopoly models comparison:

1. Highest market output
    1.1. Bertrand
    1.2. Stakelberg
    1.3. Cournot
    1.4. Collusion
2. Highest profits
    2.1. Stakelberg leader / colluding firms
    2.2. Cournot
    2.3. Stakelberg followers
    2.4. Bertrand

Contestable market:

1. All firms have access to the same technology
2. Consumers respond quickly to price changes
3. Existing firms cannot respond quickly to entry by lowering their prices
4. There are no sunk costs

➔ if the market is perfectly contestable, incumbents are disciplined by the threat of entry by new firms