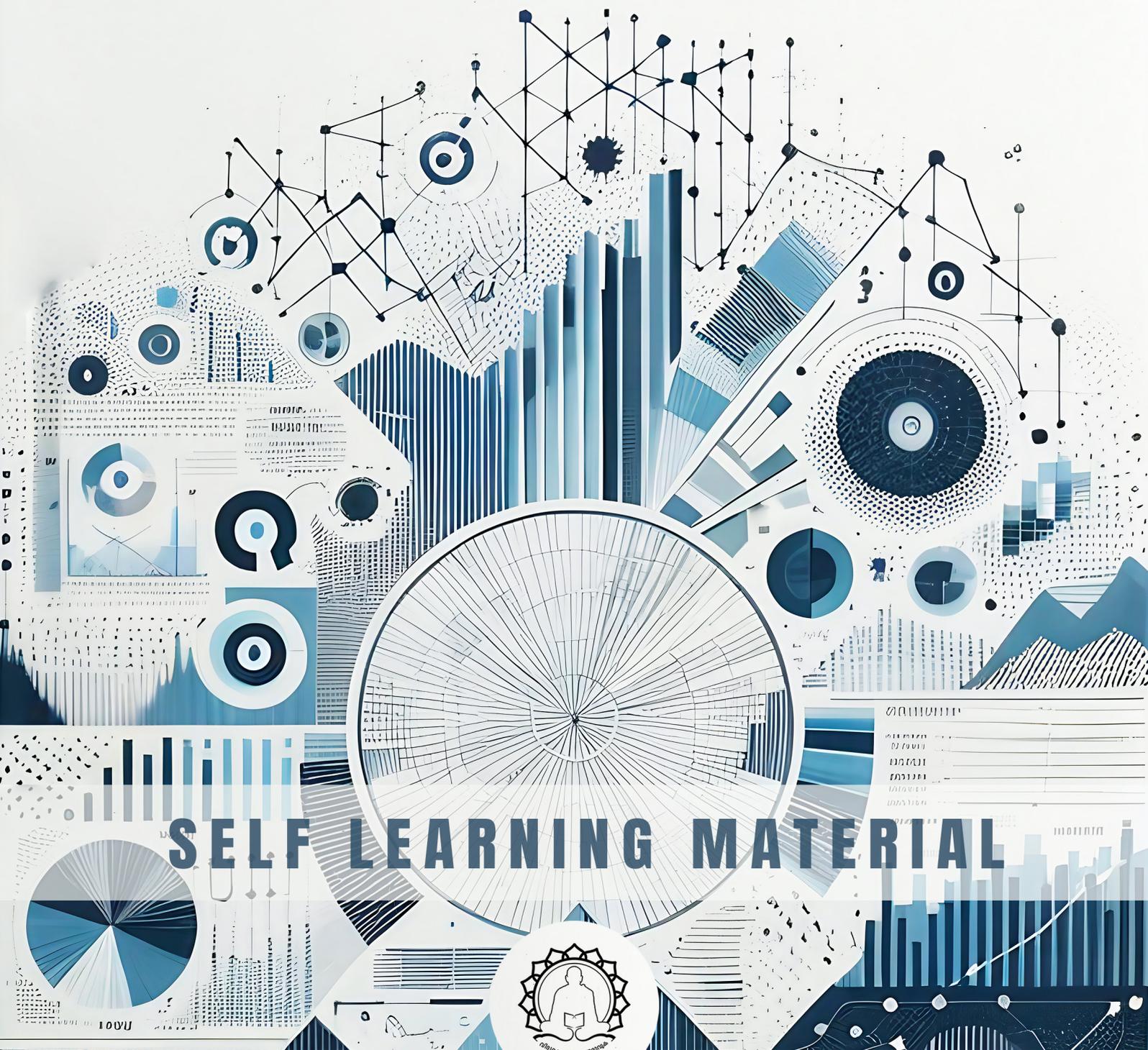


# MICROECONOMICS II

COURSE CODE: M23EC05DC

Postgraduate Programme in Economics

Discipline Core Course



**SELF LEARNING MATERIAL**



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**SREENARAYANAGURU OPEN UNIVERSITY**

The State University for Education, Training and Research in Blended Format, Kerala

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**Microeconomics II**  
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Semester - II

**Discipline Core Course**  
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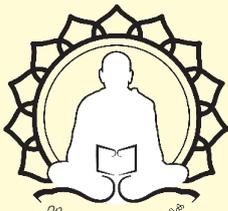


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Regards,  
Dr. Jagathy Raj V. P.

01-08-2024

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# MASTER OF ARTS ECONOMICS



## Theories of Distribution

### Block 1



# UNIT 1

## Micro Theories of Distributions

### Learning Outcomes

After completing this unit, learner will be able to:

- familiarise with how factors are rewarded
- understand the marginal productivity theory of distribution
- explain Euler's theorem and Adding up problem

### Background

Theories of distribution refers to distribution of income. The distribution of income may be functional distribution or personal distribution. The functional distribution refers to the distribution of income towards different factors of production for their functions in the production process whereas, personal distribution refers to the distribution of national income towards different individuals in a society. This functional distribution is considered under micro theories of distribution and personal distribution under macro theories of distribution. The first five units discuss the micro theories of distribution and the final unit in this block discuss the macro theories of distribution.

The difference between functional and personal distribution arises from the fact that functional distribution explains only a part of the personal distribution. Suppose an individual having land leases it for cultivation. Rent is received in return for using the land for production. Here, the land is the factor of production, and the rent the person receives is the factor price or reward for the function the land performs in the production process. The distribution of rent towards the individual is the functional distribution. The functional distribution only refers to the pricing of a particular unit of factor. In the above example, the person may have hectares of land. So, the individual's income depends on the quantities of a factor he possesses. Also, if the individual has entrepreneurial abilities to organize a business, the person may receive profit as a reward. Then, the income of the individual is the sum of rent times the amount of land

and profit. This shows the personal distribution of income which comes under macro theories of distributions. So, factor pricing explains a part of the personal distribution. The micro theories of distribution explain the functional distribution or factor pricing.

## Keywords

Land, Labour, Capital, Entrepreneur, Marginal Productivity, Value of Marginal Product, Marginal Revenue Product

## Discussion

### 1.1.1 Micro Theories of Distribution

Micro theories of distribution refer to factor pricing. Here, reward for factors or pricing of factors of production are discussed. A production process is an act of combining inputs into outputs. The most important inputs or factors of production are land, labour, capital, and entrepreneurship. The price of these factors are rent for land, wages for labour, rate of interest for capital, and profit for entrepreneurship. Pricing of these factors is micro theories of distribution. One of the fundamental theories of distribution that explains how factor price is determined is the Marginal productivity theory of distribution. It explains the distribution of income towards factor payments where the remuneration of factors is based on the factor's marginal productivity.

Demand for factors are made based on the price of the factors. Similarly, the supply of inputs too depends on the price or reward for the inputs. However, this is not true for all factors, especially for land and entrepreneurs. For these factors, the price alone cannot determine the supply. Conversely, the supply of labour and capital is positively related to their price viz. wage, and interest rate, respectively. This unit discusses a general theory of determining factor prices. The following units discuss factor pricing of the four factors of production in detail.

Before going into marginal productivity theory, it is important that we explain some of the concepts given below.

- **TPP = Total physical output**
- $ARP = \frac{TRP}{\text{No. of units of factor}}$
- $MPP = TPP_n - TPP_{n-1}$

**a. Total Physical Product (TPP):** This is the total units of output produced using the particular number of units of inputs of production.

**b. Average Physical Product (APP):** It is the number of units of output produced per unit of an input.

$$ARP = \frac{TRP}{\text{No. of units of factor}}$$

**c. Marginal Physical Product (MPP):** It is the addition to total output produced when one more unit of the factor is employed.

$$MPP = TPP_n - TPP_{n-1}$$

**d. Total Revenue Product (TRP):** It is the total money received from the sale of total physical product.

$$TRP = TPP \times P$$

- **TRP = TPP × P**
- $ARP = \frac{TRP}{\text{No. of units of factor}}$
- **VMP = MPP × P**

**e. Average Revenue Product (ARP):** It is the revenue product per unit of input.

$$ARP = \frac{TRP}{\text{No. of units of factor}}$$

**Value of Marginal Product (VMP):** It is the market value of marginal physical product (MPP)

$$VMP = MPP \times P$$

**f. Marginal Revenue Product (MRP):** It is the addition to the total revenue product when one more additional unit of input is used. It can also be defined as marginal physical product times marginal revenue.

$$MRP = TRP_n - TRP_{n-1}$$

Or

$$MRP = MPP \times MR$$

- **MRP = MPP × MR**

Under perfect competition, since AR is equal to MR, VMP, which is equal to MPP times P or AR, will be the same as MRP, which is equal to MPP times MR.

i.e., under perfect competition, when  $AR = MR$ ,  $VMP = MRP$ .

But under conditions of imperfect competition, MR is less than AR, and VMP is greater than MRP, i.e., under imperfect competition, when  $AR > MR$ ,  $VMP > MRP$ .

The graphical representation of VMP and MRP under perfect and imperfect market conditions is shown below.

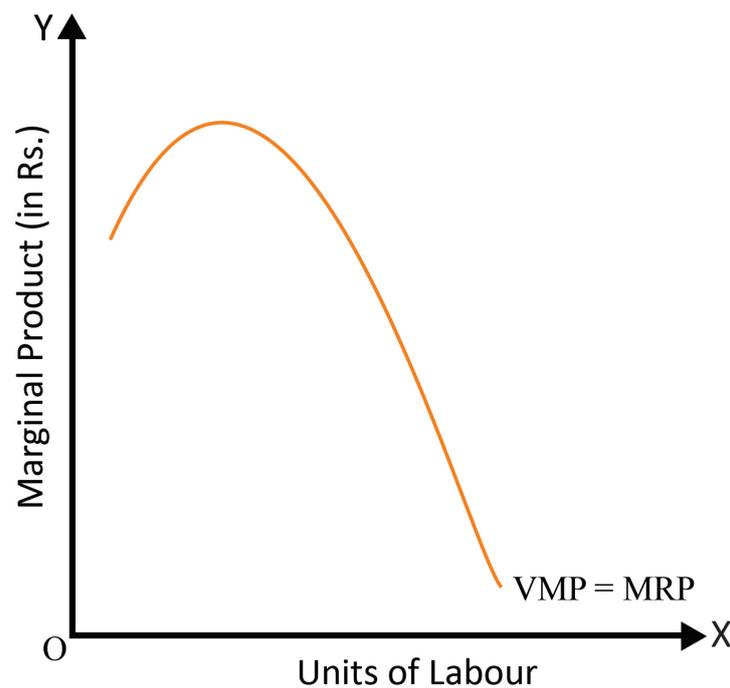


Fig 1.1.1 VMP and MRP at Perfect Competition

- Perfect competition, when  $AR = MR$ ,  $VMP = MRP$

The figure shows that MPP follows the law of variable proportion, i.e., MPP rises first with increasing TPP, then, when the stock of TPP increases, MPP falls, showing the inverted 'U' shape of VMP and MRP curves. Under perfect competition,  $VMP = MRP$ .

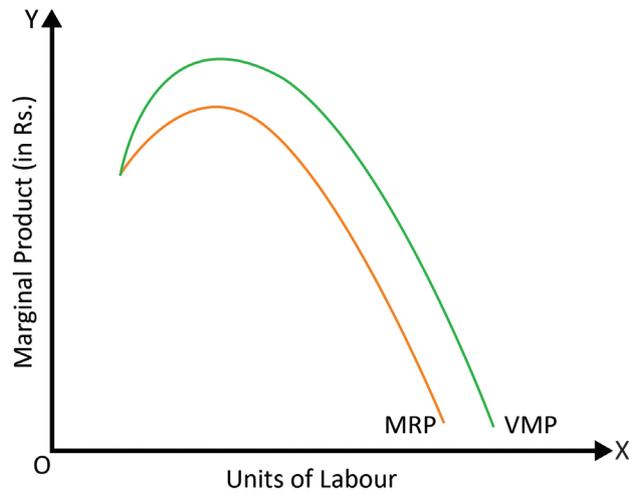


Fig 1.1.2 VMP and MRP at Imperfect Competition

- Imperfect competition, when  $AR > MR$ ,  $VMP > MRP$

The shape of VMP and MRP curves are 'U' shaped. Under imperfect competition, VMP is greater than MRP.

The following figure shows the relationship between ARP and MRP.

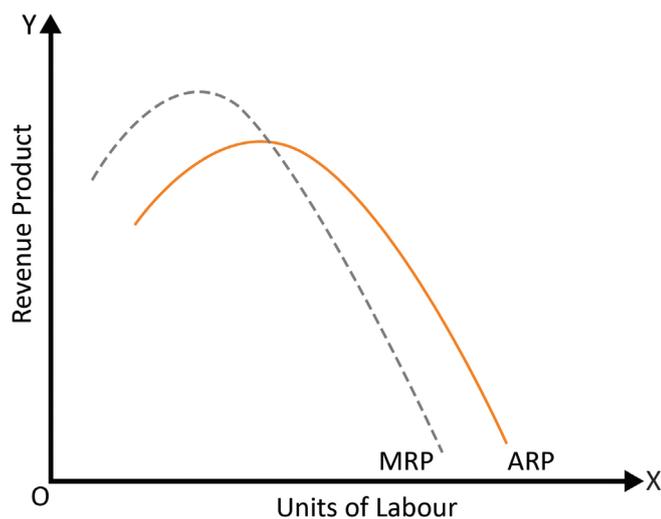


Fig 1.1.3 ARP and MRP

- First stage - MRP exceeds ARP, and later ARP exceeds MRP

Under the law of variable proportion, we know that the marginal product increases in greater proportion than the average product in the first stage and becomes less than APP in the second stage. So, here, too, MPP exceeds APP in the first stage and then falls. Consequently, MRP exceeds ARP in the first stage, and ARP exceeds MRP after that. MRP cuts ARP at the highest point of ARP.

### 1.1.2 Marginal Productivity Theory of Distribution

- Price of factors determined based on marginal productivity of factors

Contributions to the Marginal Productivity Theory of Distribution were given first by Ricardo, Longfield, and Henry George. The theory was developed to the present state by J B Clark, Wicksteed, Jevons, and Marshall. The Marginal Productivity Theory mainly proposes that the price of factors of production or reward for factors are determined based on the marginal product of factors. We know that the marginal product refers to the addition to the total product when one more input is used for production, and productivity refers to the capacity of the unit of input to turn out the unit of output per unit of time. So, under marginal productivity theory, the price of factors is determined based on the marginal productivity of factors.

#### Assumptions:

- Existence of perfect competition in factor and product market
- For a given factor, the units of factors are identical, and each factor is perfectly divisible
- There is perfect mobility of factors
- There is full employment of resources
- Productivity of factors can be measured

Let us explain the important aspects of marginal productivity theory:

#### 1. Reward for factors of production is determined by Marginal Revenue Product

This can be explained with the following example. Suppose you are an employer wanting to employ one more labour for your production unit; you will be employing the factor based on the productivity of the labourer. If the labourer has high

- Equilibrium employment,  $MRP = W$

productivity, a high wage needs to be paid and vice versa. The decision in this regard will be taken based on the marginal product of the last labourer and the wage paid. Here, if MRP is greater than wage rate, the employer will tend to accept more labourers since, for a particular wage rate, the marginal revenue received is higher. However, for the reverse, where MRP is less than the wage rate, marginal revenue from the last labourer is less than the wage rate. The employer will not employ in the particular situation. When MRP is equal to the wage rate, the employer will no longer employ or reduce employment. The following figure gives the equilibrium point when employment equals MRP.

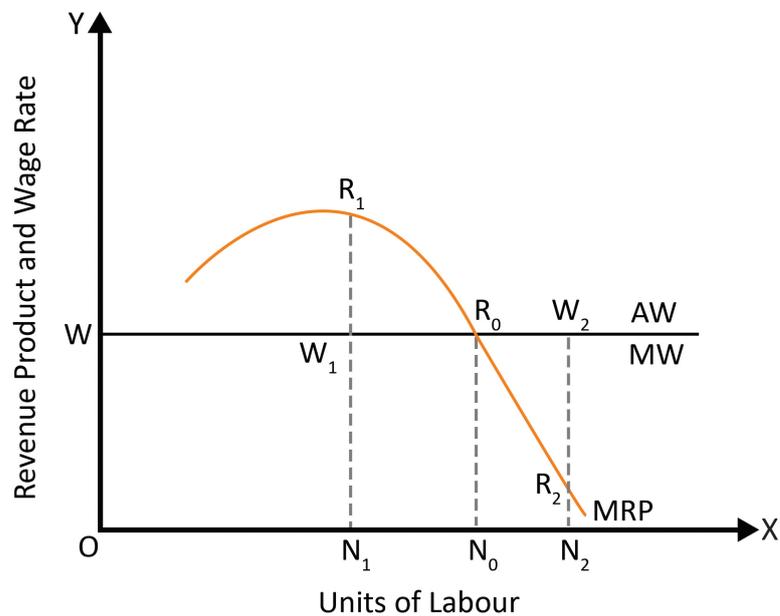


Fig 1.1.4 Equality of MRP and Wage

- Factors are rewarded according to the marginal revenue product

When employing  $N_1$  amount of labour, the wage rate is  $W_1$ , and MRP is  $R_1$ . Here, MRP is greater than the wage rate. Employer will be ready to accept more labourers, and employment will increase to  $N_0$ . At this point, the wage rate is equal to  $W$  at the point  $R_0$ . However, if the level of employment is at  $N_2$ , with a lower MRP,  $R_2$ , the employer will reduce employment and reach equilibrium point  $N_0$ . Therefore, factors are rewarded according to the marginal revenue product, and employment is determined at the equilibrium point.

## 2. Factor price equal MRP and ARP in the long run

In the short run, if there is super normal profit earned by some employers, attracted by this profit, more employers will enter into the market. With new entrants, average and marginal products fall. If there is a loss in the short run, some firms leave the market, leading to efficient units leaving. Then, with less stock of output, the average and marginal product rises. So, in the long run, firms earn only normal profit and MRP and ARP are equal.

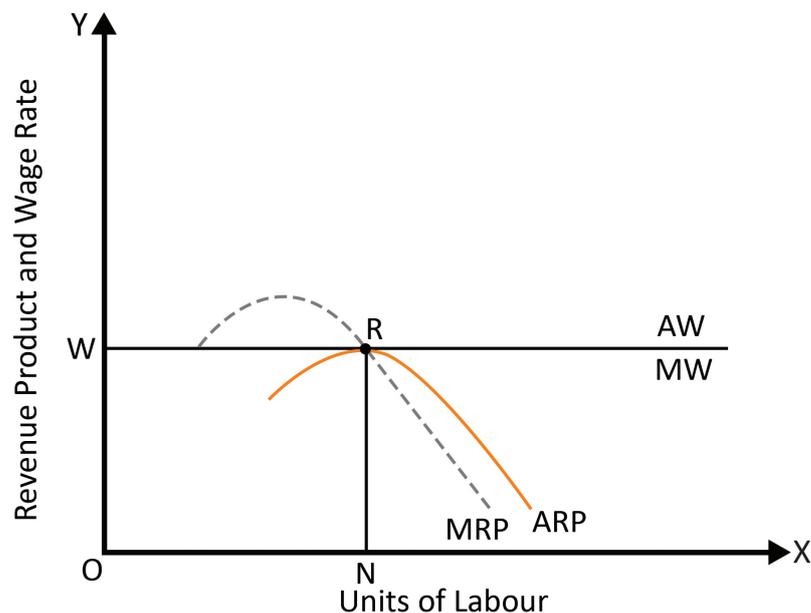


Fig 1.1.5 Long-run Equilibrium

- Long run,  
 $W = ARP = MRP$

Here, the equilibrium wage rate is  $OW$  when  $ARP$  is equal to  $MRP$ . With  $ON$  employment, the profit earned is normal, and the reward for factors is equal to  $ARP$  and  $MRP$  in the long run.

## 3. In the long run, MRP is equal for all factors

Let us suppose there are two factors employed in the production process: labour and capital. In the long run, the Marginal Revenue Product is said to be equal for both products. In the short run, the  $MRP$  of labour may be greater than the  $MRP$  of capital. Then, the employer will substitute labour for capital. With the increase in the stock of labour and fall in the stock of capital, the  $MRP$  of labour falls and capital increases. So,

in the long run, the MRP of both labour and capital increases.

$$\text{i.e., } MRP_L = MRP_K$$

$$\bullet \frac{\text{MRP of L}}{\text{Price of L}} = \frac{\text{MRP of K}}{\text{Price of K}}$$

However, the MRP of factors can be equal in the long run when the price of the factors is equal. But, this is not the case in the long run. In the long run, with different prices, the proportion of MRP and prices of factors become equal.

$$\frac{\text{MRP of L}}{\text{Price of L}} = \frac{\text{MRP of K}}{\text{Price of K}}$$

A critical evaluation of the Marginal Productivity Theory is that the statement that the price of the factors is determined based on the marginal productivity of the factors remains unchanged. This statement has formed the basis of the income distribution, and when all factors are paid according to their marginal product, total product in the economy will be exhausted, i.e., product exhaustion happens. When viewing the price of factors determined based on MP, it implies that other variables affecting factor prices have no role. Let us see some criticisms of Marginal Productivity Theory.

- a. Measuring Productivity is difficult:** The price of factors equal marginal product implies that productivity can be measured accurately. Since production is a result of a combination of inputs, with all inputs having a role in the increment in the product, it is difficult to find the contribution of one input to the total output separately.
- b. Two-way relation between Marginal Productivity and Wages:** As per the theory, the wage is determined by the marginal product of labour. However, it is important to note that a higher wage means higher health care, better intake of nutrient food, and better education options, leading to higher marginal productivity. So, wage rate too determines marginal productivity, not only the opposite relation.
- c. Unrealistic Assumptions:** Assumptions such as perfect competition, static system, full employment, perfect mobility of factors, and homogeneity of factors are not realistic in nature considering the practical situations.
- d. Exploitation of Labour:** Considering wage rate equal to the marginal productivity of last labour means others are exploited.

- Difficulty in measuring contribution of one unit, Wage determining MP, Unrealistic assumption of perfect competition, neglect of supply side

- e. **Product Exhaustion does not work under increasing or decreasing returns to scale.**
- f. **Neglect of supply side, selling costs, social and institutional factors**

Considering the weakness of Marginal Productivity Theory, the modern theory of distribution is proposed later.

### 1.1.2.1 Modern Theory of Distribution

- Demand for and supply of factors determine the price of factors

Modern Theory of Distribution considers both demand and supply of factors in determining factor prices. As the price of products or commodities is determined according to the demand and supply of commodities, the price of factors too is determined based on the demand and supply of factors. Modern theory also assumes the existence of perfect competition, full employment situation, and perfect mobility of factors. Let us explain the theory.

#### Demand Side

- MRP curve of labour is the demand curve for labour

Demand for factors is derived demand. Factors are demanded as they are used for the production of commodities demanded by consumers. The extent of demand for commodities determines the demand for factors used to produce the commodities. With greater demand for products, factors are also demanded in greater quantity. Thus, demand for factors depends on the demand for products, substitutability of factors, and quantity of productive factors. The demand curve for factors, say labour may be derived from the fact that labour is demanded at MRP equals the wage, so MRP curve can be considered as demand curve for labour.

The following curve gives the demand curve for labour in the industry.

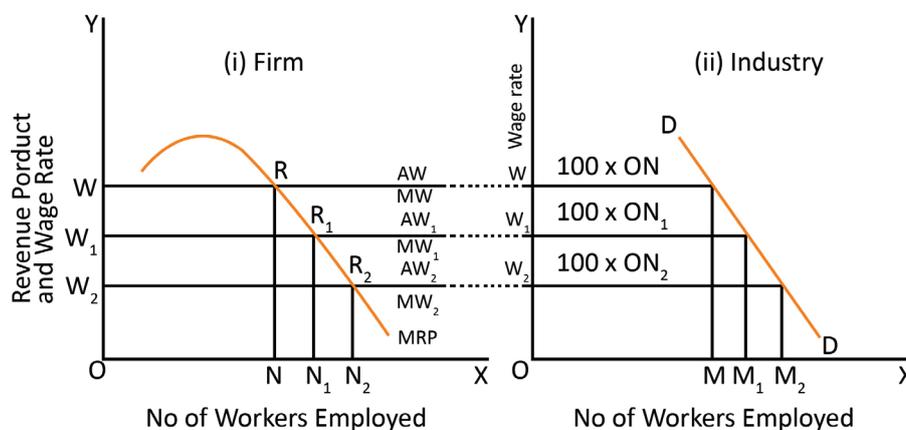


Fig 1.1.6 Demand curve for Labour

- Industry demand curve for factors is negatively sloped

The demand curve of labour for firm shows that MRP is U-shaped with demand for labour increasing with a fall in the wage rate. In the case of an industry having many firms, say 50 firms, then ON labour at a single firm case becomes 50 times ON labour, leading to OM level of labour at the industry case. For the industry level, too, a fall in wage from  $W$  to  $W_2$  increases labour from OM to  $OM_2$ . The industry demand curve is DD, which is negatively sloped, showing the inverse relation between wage rate and amount of labour.

### Supply Side

- Industry supply curve for factors is positively sloped

The industry supply curve is upward sloping, showing the fact that with an increase in wage rate, the supply of labour increases. With increasing demand for labour, supply is matched by attracting workers from other industries by hiking wage rate. The positively sloped supply curve is shown below.

For the modern theory of distribution, factor price is determined by the demand for and supply of factors. The following figure represents the determination of factor price.

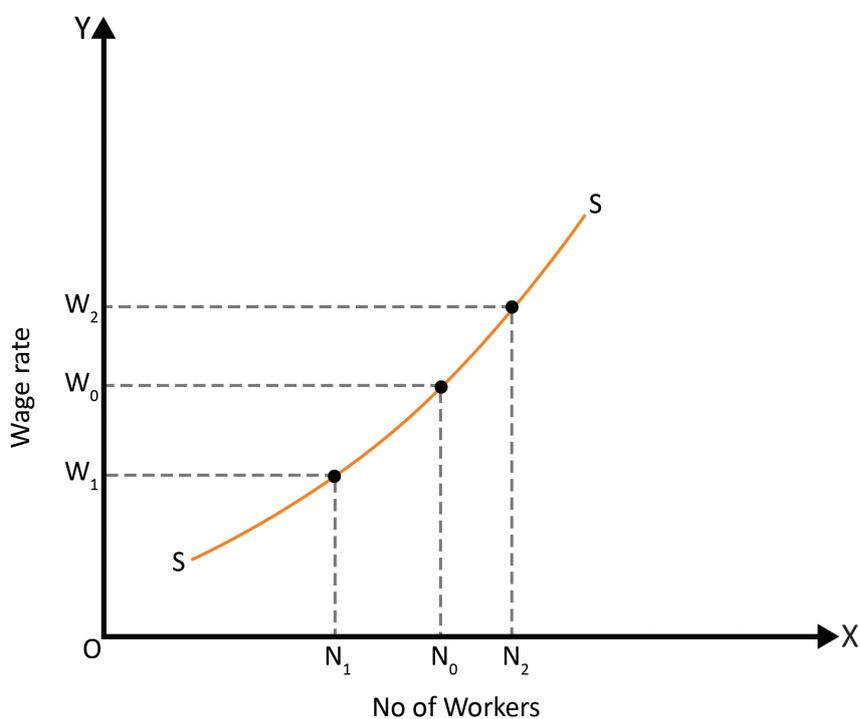


Fig 1.1.7 Supply curve of Labour

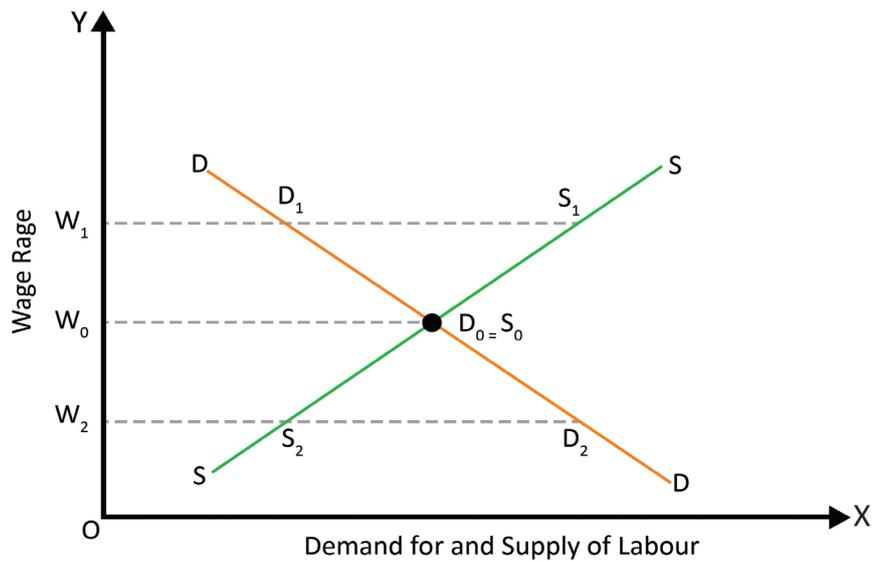


Fig 1.1.8 Demand for and Supply of Labour determining Wage

- Factor price determined at equality of demand and supply of factors

At a wage rate equal to  $W_0$ , the demand for labour is equal to the supply of labour. Any mismatch in demand and supply, say excess supply at  $W_1$ , brings into equality when workers compete to work for a lesser wage rate rather than remain unemployed. Similarly, excess demand at  $W_2$  is dealt by employers rising wage rate. Factor price is determined at  $W_0$  when demand is equal to supply.

It is important to note that the modern theory of distribution too depends on unrealistic assumptions of perfect competition with perfect mobility of factors. The marginal productivity theory explains factor price distribution. Let us discuss the extensions of this theory.

### 1.1.3 Adding up Problem and Product Exhaustion Theorem

- Value of Product = Cost of factors

Marginal Productivity theory of distribution culminated in the product exhaustion theorem or adding-up problem. In the 1930's, questions were raised whether the factor prices determined by Marginal Productivity Theory are able to satisfy basic accounting identity. Marginal Productivity theory states that factor prices will equal the value of Marginal Product of factors. If we employ two factors, say capital and labour, the following identity will be established.

Value of Product = Cost of Labour + Cost of Capital .....(1)

Thus,  $PQ = w.L + r. K$  ..... (2)

• Factor shares add up to unity

The above equation shows that factor shares should add up to the total value of the product or factor shares should add up to unity.

Dividing both sides by PQ,

$$PQ/PQ = w.L/PQ + r. K /PQ..... (3)$$

$$1 = w.L/PQ + r. K /PQ..... (4)$$

$$1 = \text{Share of Labour} + \text{Share of Capital}$$

i.e., factor shares add up to unity

Here, the question is that whether the marginal productivity theory determines factor prices at levels required to fulfil product equals income identity.

It is clear from the above that when all factors are paid according to the value of its marginal product, total output is exhausted.

The marginal product theory justifies this identity.

$$Q = MPPL. L + MPPK. K ..... (5)$$

Multiplying both sides by P

•  $PQ = (MPPL. P). L + (MPPK. P). K$

$$PQ = (MPPL. P). L + (MPPK. P). K ... (6)$$

We know that  $(MPPL. P)$  is  $VMP_L$  and  $(MPPK. P)$  is  $VMP_K$

$$\text{Value of total product} = VMPL + VMPK ..... (7)$$

i.e.,  $PQ = \text{Value of output}$

• Marginal productivity theory of distribution leads to adding-up or product exhaustion

It is clear that when factors are paid according to the value of the marginal product, all products are exhausted through payments, or factor payments add to the total value of output. This proves that product is equal to income. Therefore, marginal productivity theory leads to the *adding up* of factor shares.

### 1.1.4 Euler's Theorem

Leonard Euler proved that if constant returns to scale exist, product exhaustion will occur.

$Q = (MPP_L) \cdot L + (MPP_K) \cdot K$  hold for production functions that exhibit constant returns to scale.

The equation can be written as

$$Q = \frac{dQ}{dL}L + \frac{dQ}{dK}K$$

- Product exhaustion happens when production has constant returns to scale

where  $MPP_L$  is  $\frac{dQ}{dL}$  and  $MPP_K$  is  $\frac{dQ}{dK}$

Therefore, the share of labour plus the share of capital is unity when output is converted into money terms, under constant returns to scale.

#### Proof:

Let a production function  $Q = f(L, K)$  be homogenous of degree 'v'

Homogeneity can be represented as below,

$$F(\lambda L, \lambda K) = \lambda^v \cdot f(L, K)$$

Differentiating with respect to  $\lambda$ ,

$$L \cdot \frac{df}{dL} + K \cdot \frac{df}{dK} = v \lambda^{v-1} \cdot f(L, K)$$

Under constant returns to scale,  $v = 1$ , and we have

$$L \cdot (MPPL) + K \cdot (MPPK) = f(L, K)$$

As  $f(L, K) = Q$ ,

$$L \cdot (MPPL) + K \cdot (MPPK) = Q$$

Making output in price terms,

$$PQ = L \cdot (MPPL \cdot P) + K \cdot (MPPK \cdot P)$$

- $PQ = L \cdot (MPP_L \cdot P) + K \cdot (MPP_K \cdot P)$

This shows that payment of factors according to their VMP causes exhaustion of output, and therefore, the share of factors adds up to unity. Euler's theorem is an identity where it holds for all values of the variables.

## Summarised Overview

Land, labour, capital, and entrepreneurship are the four factors of production. Factor prices are usually determined by the demand and supply of factors. Factor pricing is generally referred to as the theory of distribution. Functional distribution refers to the distribution of income towards the factors of production. This is considered under micro theories of distribution. Marginal Productivity Theory of distribution explains how the price of factors of production is determined. The Marginal Productivity Theory mainly proposes that the price of factors of production or reward for factors are determined based on the marginal product of factors. Marginal Productivity Theory has some unrealistic assumptions, such as the static economy and the prevalence of perfect market conditions in the economy. Reward for factors is determined by the marginal revenue product. In the long run, factor price is equal to both MRP and ARP. Under modern version of marginal productivity theory, at the equilibrium of demand and supply, the price of a factor is equal to the marginal productivity of the factor. It states that the value of total output is equal to the sum of shares of factors. Euler's theorem proved that if constant returns to scale exist, product exhaustion will occur.

## Assignments

1. Distinguish between functional and personal income distribution.
2. Explain the various concepts viz. TPP, APP, MPP, VMP, ARP, MRP.
3. Explain marginal productivity theory. Elucidate the modern version of the theory.
4. Explain the Adding up problem and Euler's theorem.

## Suggested Reading

1. Snyder, Christopher, Nicholson, Walter. (2012). *Microeconomic Theory: basic principles and Extension* (Ed. 11th) United State: Cengage Learning.

## Reference

1. Salvatore, D. (2003), *Microeconomics -Theory and Applications* (Fourth Edition), Oxford University Press.
2. Koutsoyiannis, A. (1990), *Modern Microeconomics* (Second Edition), Macmillan Education.
3. Verma K.N. (2017), *Microeconomic Theory*, Vishal Publishing Co.



## UNIT 2 Wages

### Learning Outcomes

After completing this unit, learner will be able to:

- know the determination of wage under perfect competition
- distinguish between wage determination under perfect and imperfect competition

### Background

Labour is a key factor of production in many fields, such as agriculture, industries, construction, hotels, mining and quarrying, tourism etc. Though technological innovations have reduced the number of labourers required in many fields, labour is still a vital factor without which production cannot take place. Generally, the wage rate in the labour market is determined by the demand and supply of labour. Demand for labour comes from employers who operate firms in the above-mentioned fields. The supply of labour comes from the population who are able and willing to do work. In market terms, these employers can be referred to as buyers of labour, and those who are willing to do work can be referred to as sellers of labour.

### Keywords

Value of Marginal Product of Labour, Marginal Revenue Product of Labour, Average Revenue Product of Labour, Marginal Factor Cost of Labour, Monopsony

## Discussion

- Price of labour

### 1.2.1 Wage

Wage is the price of the factor, labour where it is given to the work done by human beings in return for money. The wage is determined at the equilibrium point of demand and supply of labour. For each type of market condition in the economy, there exist different ways of determining wage. The following sections explain the determination of wage rates under different market conditions, viz., perfect and imperfect market conditions.

### 1.2.2 Determination of Wage under Perfectly Competitive Market

We have already learnt during under graduation that perfect competition is a market situation where there is the presence of a large number of buyers and sellers of a product. With a large number of buyers and sellers, the firm is a price taker. In the labour market, perfect competition represents the price of labour, and wage is given. So, the wage rate is determined by the entire market force of demand and supply. Here, the wage rate is equal to MRP.

#### 1.2.2.1 Short-Run Equilibrium

The equilibrium wage rate is equal to the value of the marginal product of labour,  $VMP_L$ , which is equal to MRP under a perfect competition situation.

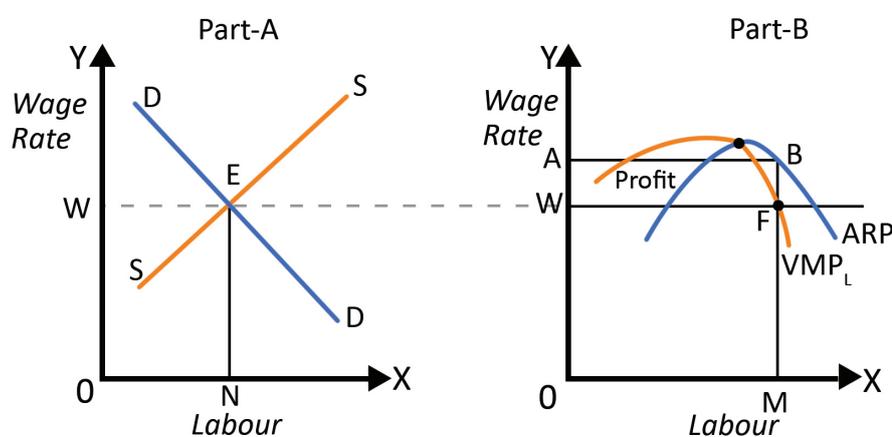


Fig 1.2.1 Determination of Equilibrium Wage Rate for a Firm in Short Run

- $VMP = MRP = \text{Wage Profit}$ , ARP greater than VMP

In the figure, it is shown that the forces of demand and supply determine the wage rate under perfect competition. With the OW wage rate, firms make a profit equal to WFBA, and the amount of labour equals OM. With labour less than OM, VMP is greater than OW wage rate allowing firms to employ more labourers. This addition in employment happens until VMP is equal to the OW wage rate and the OM level of employment is met. The converse happens with labour that is higher than OM. In the short run, as the Average Revenue Product, the ARP of labour is higher than the wage rate, so firms earn profit equal to WFBA. The firm earns a loss if ARP is lesser than VMP and earns a normal profit if ARP is greater than VMP.

### 1.2.2.2 Long-Run Equilibrium

In the short run, firms earn profit. Attracted by this profit, more firms enter into the industry. This increases the demand for labour, leading to a hike in the wage rate. In the long run, the equilibrium point is achieved when the wage rate is equal to both the Average Revenue Product and the Value of the Marginal Product of labour.

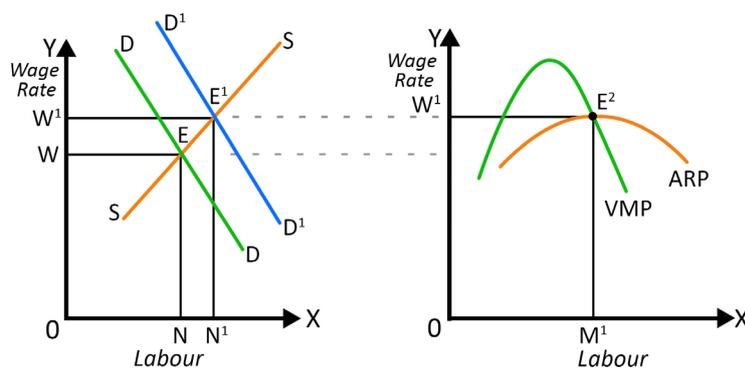


Fig 1.2.2 Determination of long-run equilibrium in a perfectly competitive market

- Normal profit,  $VMP = ARP$

The shift of the demand curve from DD to  $D^1D^1$  shows the increase in demand for labour due to the entry of more firms. With the increase in demand, the wage rate increases to  $OW^1$ . Equilibrium, in the long run, is at the point  $E^2$ , the level of employment is  $OM^1$ , and the wage rate is  $OW^1$ . Here, the wage rate is equal to VMP and ARP. The firm makes a normal profit in the long run.

### 1.2.3 Determination of Wage under an Imperfectly Competitive Market

There are two models of wage determination under an imperfectly competitive labour market. They are the determination of wage with imperfect competition or monopsony in the labour market and perfect competition in the product market; and the determination of wage with imperfect competition in both the market i.e., monopsony in the labour market and monopoly in the product market. Let us discuss them.

- Monopsony in labour market

#### 1.2.3.1 Determination of Wage under Imperfect Competition / Monopsony in the Labour Market and Perfect Competition in the Product Market

Monopsony means a market with a single buyer. It means the existence of a single buyer, for a product or a factor. The monopsony here means the existence of a single buyer in the labour market. The situation of monopsony can exist only when the employer has a large pool of labourers at hand. Like the monopolist influencing the price of the product, a monopsonist can influence the price of a factor with a huge number of labourers at hand.

- MRP = Marginal wage  
MRP cuts MFC from above

Labour supply in monopsony market is shown by the Average wage curve. However, the marginal wage curve or marginal factor cost (MFC) lies above the average wage curve. Both AW and MFC curves are upward sloping. The equilibrium situation in imperfect competition is that MRP is equal to marginal wage, and the MRP curve cuts MFC from above.

Wage rate determination under a monopsony labour market and a perfectly competitive product market is given below.

- Wage rate at AFC

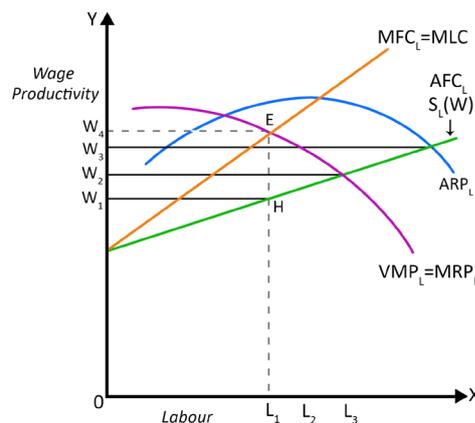


Fig 1.2.3 Determination of Wage under Monopsony Labour Market and Perfectly Competitive Product Market

- $VMP_L = MRP_L$ , there is monopsonist exploitation

The monopsonist demand curve is given as the  $MRP_L$  curve, which is equal to the  $VMP_L$  curve under perfect competition in the product market. The supply curve of monopsonists is  $AFC$ , where the wage rate is fixed.  $MFC_L$  lies above  $AFC_L$ . The equilibrium is at the intersection of  $MRP$  with  $MFC$  at  $E$ . Here,  $OL_1$  labour is employed. The equilibrium wage rate is  $OW_1$  since the wage rate is determined at the  $AFC_L$  curve (where  $AFC$  equals the vertical line downwards from the equilibrium point,  $E$ ). This intersection is at  $H$ . The equilibrium wage rate,  $OW_1$  is lower than the Marginal Revenue Product as  $MRP$  equals  $L_1E$  in the figure and wage rate,  $OW_1$  equals  $L_1H$ . The difference between  $MRP$  and wage rate is  $EH$ . This  $EH$  represents exploitation of labour since they are not paid according to the marginal revenue product but based on average fixed cost. The exploitation happens as there is a single buyer or monopsonist.  $EH$  is called monopsonist exploitation.

### 1.2.3.2 Determination of Wage under Monopsony in the Labour Market and Monopoly in the Product Market

- $MRP$  not equal to  $VMP$

Under monopoly in the product market, the Value of Marginal Product ( $VMP$ ) and Marginal Revenue Product ( $MRP$ ) are different, and  $VMP$  is greater than  $MRP$ . Wage determination under monopsony in the labour market and monopoly in the product market is shown below.

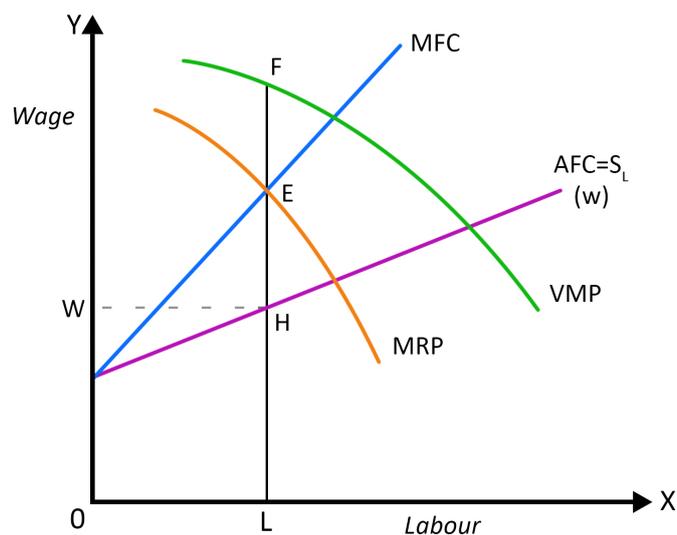


Fig 1.2.4, Determination of Equilibrium Wage Rate under Monopsony in the Labour Market and Monopoly in the Product Market

- VMP not equal to MRP, experience both monopolistic and monopsonistic exploitation

Here, too, the equilibrium in the monopsony labour market is at E, where MRP intersects with MFC. The equilibrium wage rate is OW, determined at the intersection of the vertical line from E to AFC (supply curve of labour). As we know, the wage rate is determined at the AFC or supply curve. In the figure, the OW wage rate is equal to LH. In this situation, the wage rate paid, LH, is also less than the marginal revenue product of labour, LE. EH is the monopsonist exploitation. However, since under monopoly in the product market, the value of the marginal product is not equal to the marginal revenue product. VMP is LF (determined at the intersection of VMP with the vertical line above E), and MRP is LE. The difference between VMP and MRP is FE. So, under a monopoly, labourers are paid an FE amount that is less than the value of the marginal product. This is called monopolistic exploitation. Under monopsony in the labour market, labourers are paid less than their marginal revenue product, whereas under monopoly in the product market, they are paid less than the value of the marginal product. Therefore, labourers experience double exploitation when the labour market has a single buyer of labour, and the product market has a single seller of a product.

## Summarised Overview

Wage is the price of labour. Wage is determined at the equilibrium of demand and supply of labour under a perfectly competitive labour market. At the equilibrium point, the wage rate is equal to the value of the marginal product of labour,  $VMP_L$ . Profit in the short-run equilibrium is materialised when the Average Revenue Product of labour is higher than the wage rate offered. In the long run, firms reap only normal profit. Imperfect competition in the labour market refers to the existence of monopsony. Monopsony refers to a single buyer of a product or factor. It mostly prevails when there is unorganised labour, restricted in their mobility from one job to another. Marginal Factor Cost of labour is higher than the Average Factor Cost or Supply Curve of Monopsonist. The equilibrium in the monopsony market is at the intersection of the Marginal Factor Cost of labour and the Value of Marginal Product of Labour. Under imperfect competition in the product market, the value of the marginal product of labour is not equal to the marginal revenue product of labour. Monopsonist exploitation happens when the wage is fixed less than the marginal revenue product of labour. Monopolist exploitation happens when the wage is fixed less than the value of the marginal product of labour.

## Assignments

1. Explain wage determination for short run and long run equilibrium conditions under perfect competition.
2. Discuss the monopsony condition. Analyse how usage is determined under monopsony in labour market and perfect competition in product market.
3. Elucidate on wage determination under monopsony in labour market and monopsony in product market.

## Suggested Reading

1. Snyder, Christopher, Nicholson, Walter. (2012). *Microeconomic Theory: basic principles and Extension* (Ed. 11th) United State: Cengage Learning.

## Reference

1. Verma K.N. (2017), *Microeconomic Theory*, Vishal Publishing Co.
2. Salvatore, D. (2003), *Microeconomics -Theory and Applications* (Fourth Edition), Oxford University Press.
3. Koutsoyiannis, A. (1990), *Modern Microeconomics* (Second Edition), Macmillan Education.



## UNIT 3

### Rent

#### Learning Outcomes

After completing this unit, learner will be able to:

- understand the theories of rent
- distinguish between scarcity rent and differential rent
- get introduced to quasi-rent

#### Background

Rent is the payment or price for using the factor of production, land. It is the only factor of production which is considered fixed. Though, for a society as a whole, the supply of land is considered fixed and inelastic, however, considering the alternative uses of land, for a single industry, the availability of land is not fixed. We know that there are many uses for land, viz. agriculture, residential purposes, industrial purposes, office buildings, etc. As a whole, the amount of supply of land is fixed. However, land can be diverted from agriculture to industry or residential purposes and vice versa. If land is diverted from agriculture to industry, for industry, the supply of land is not fixed, and industry may receive land from agriculture. The rent is the price for the land and is determined mainly based on the demand for land.

Important rent theories that you might have dealt with at graduate levels are the Ricardian Theory of rent, the modern theory of rent, and quasi rent theory. In all these theories, rent is basically determined by the forces of demand and supply. For Ricardian theory, rent is determined based on the demand for products produced on land. Quasi-rent is the extension of the Ricardian concept. This unit discusses in detail the Ricardian theory of rent and Quasi – rent.

## Keywords

Land, Ricardian Rent, Scarcity Rent, Differential Rent, Quasi Rent

## Discussion

### 1.3.1 Rent

Mostly, we hear of rent as the price of lending houses, shops, hotel rooms, etc. Generally, it refers to the price of lending buildings. Considering the four factors of production, usually, rent is the price fixed for the factor, land. The buildings are made on land. So, rent is the price of the land. We know that land is a fixed factor. The supply of land does not change corresponding to the changes in the price of the land; hence, referred to as a fixed factor. Since rent is the price of a fixed factor, the term rent is used in economics as the price of other factors too that are fixed in supply. So, rent or pure economic rent is the payment for factors that are fixed in supply.

- Rent – Price of fixed factor

Like the price of any commodity, which is determined by the demand and supply of the commodity, rent, the price of the fixed factor can also be determined based on the demand and supply of the factor. Since the supply of land is fixed and inelastic, it is represented vertically. With supply being fixed, the demand for the land determines the price of it. Demand is represented negatively sloped showing inverse relation with price of factor and demand for the factor. The intersection of the vertical supply curve for the fixed factor and the negatively sloped demand curve determines the rent. Since supply is fixed, the change in rent is due to a change in the demand for the fixed factor. The following figure shows the determination of rent at the intersection of demand and supply of fixed factors.

- Rent determined at the intersection of demand and supply of fixed factor

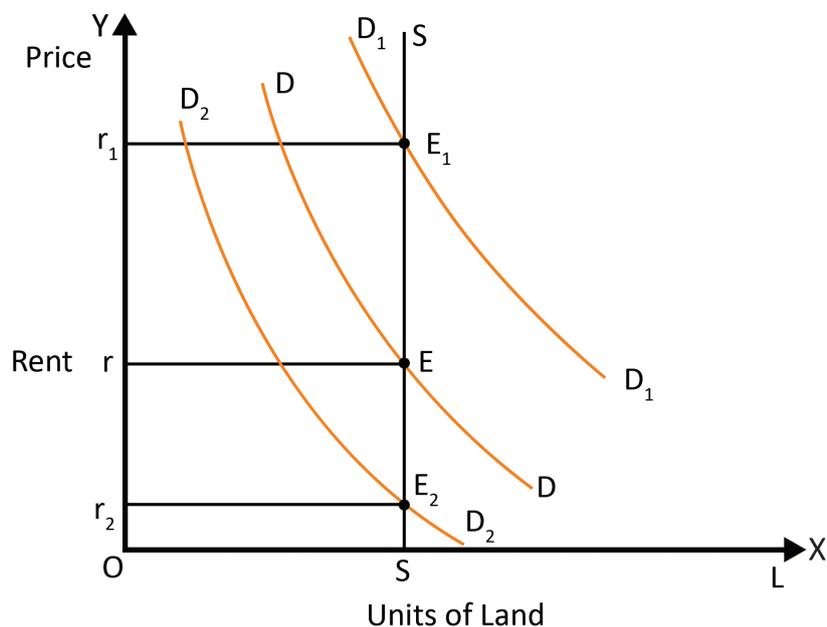


Fig 1.3.1 Determination of Rent at the Intersection of Demand and Supply

- With the supply curve vertical, the demand curve determines the rent

The SS supply curve is vertical, showing the inelasticity of supply. DD is the original demand curve. The intersection is at point 'E', and rent is 'r'. When demand for the fixed factor increases to  $D_1D_1$ , with fixed supply, the price of the factor increases to  $r_1$  with the intersection at  $E_1$ . When demand for the factors decreases to  $D_2D_2$ , rent falls to ' $r_2$ '. Therefore, with a fixed supply, demand for a factor affects the rent or price of the factor.

We have dealt with the general determination of rent using the demand and supply of fixed factors under consideration. Now, let us discuss the Ricardian rent and quasi-rent in detail.

### 1.3.1.1 Ricardian Theory of Rent

The Ricardian theory of rent is the earliest structured theory of rent. The theory has the views of classical economists. Ricardo considered the law of diminishing returns in agriculture and based his theory of rent on this assumption. You have already dealt with diminishing returns. It refers to fall in marginal returns, here, fall in marginal returns from additional labour employed on land. He explained rent in terms of diminishing

- Rent – Paid to original land

marginal returns on land. According to Ricardo, “rent is that portion of the produce of the earth which is paid to the landlords for the use of the original and indestructible power of soil”. According to Ricardo, rent is the price for land and not a return on the investment made on the land in the form of drainages, fences, etc.

The following are the assumptions of Ricardian theory:

- Fixed supply, uses for corn, land differs in quality, perfect competition

1. The total supply of land is considered fixed since it is considered for the society as a whole. Here, the supply is taken as not responsive to the changes in rent, which is the price of the land.
2. Ricardo considered a single use for the land: the cultivation of corn. If not used for corn, it is expected to remain idle. Therefore, the transfer earning is zero for land (Transfer earning is the earning received from the alternative use).
3. Different types of land have different qualities. The quality of the land makes it into different grades, and this difference in quality explains rent.
4. There is perfect competition for land. The land owners and farmers do not influence rent.

Ricardian rent is explained in terms of scarcity rent and differential rent. We have learned about scarcity and differential rent at the undergraduate level, too. Let us explain the terms.

### Scarcity Rent

- Excess demand leads to scarcity of rent for homogenous land

When land is similar in quality, the rent on land is determined based on the relative availability of land. The similarity in quality means the capacity of the land to produce corn is similar for each piece of land available. The demand for land and scarcity of land determines rent. We have already discussed that land is fixed in supply, and the single use of land is the cultivation of corn. With supply being constant, the demand for the land is a result of the demand for corn. With the increase in demand for corn, the demand for land increases. Any scarcity of land leads to rent for the land. This rent can be explained in terms of demand and supply curves of land, as explained in the first section. The below figure shows the occurrence of rent as a result of scarcity of land due to excess demand for it.

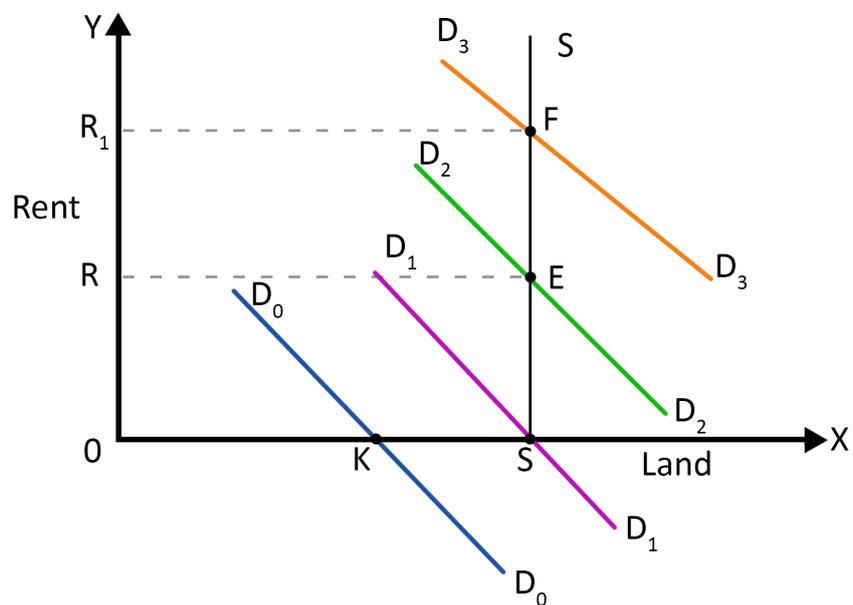


Fig 1.3.2 Scarcity Rent

- Demand for land is derived demand from demand for corn, leading to rent

With an increased population and resultant increase in demand for food, the demand for corn also increases, which in turn increases the demand for land for cultivating corn. The demand curve of land in the initial period  $D_0D_0$ . The fixed supply is shown by the vertical curve,  $SS$ . Here, the cultivation of corn does not require all the available land.  $KS$  is the excess land available. Since land remains idle, there is no rent. When demand for land increases to  $D_1D_1$ , the demand for land and supply of it equal, and there is no rent at this point also. With  $D_2D_2$  demand increase, the demand becomes higher than the supply, and there is excess demand. The land becomes scarce compared to the demand for it. The equilibrium is at  $E$  and involves the presence of rent equal to  $OR$ . When demand increases to  $D_3D_3$ , the rent increases further to  $OR_1$ . So, demand for food derives demand for land, which in turn derives scarcity rent for land under the Ricardian model.

Now, let us explain differential rent.

### Differential Rent

As the definition of rent stated by Ricardo, the rent is paid to the original and indestructible power of the soil; the power of the soil or the quality of soil plays an important role in determining rent. We know that the fertility or quality of land depends on the type of soil, rainfall in the area, weather,

- Difference in fertility leads to rent

altitude, etc. With the same level of inputs employed in the land, different qualities of land give different amounts of output. This difference in the productivity of land leads to a difference in the cost of production for each piece of land. So, with differences in the quality of land, the amount of output and the cost of production for each piece of land may be different. This difference brings out differential rent.

- Agriculture expands by moving from fertile land to less fertile land

Suppose we have come to an unexplored area where it was not inhabited by any people. When taking the land for agriculture, farmers will select the fertile land first, using their skills and experiences. When demand for food increases and the resultant derived demand for land increases, with scarcity in fertile land, farmers move to comparatively less fertile land, leading to differences in the cost of production and amount of production between fertile and lesser fertile land. We can explain the differential land by fixing four grades of land: Land C, B, and A. Land C is the most fertile land. The fertile land descends from C to A. At your undergraduate level, you might have learned differential rent based on assigning marginal return and cost of production to each grade of land, and rent will be equal to total return or output minus cost. Here, let us explain differential rent based on equilibrium positions under perfect competition.

Since Ricardo expected perfect competition in the market,

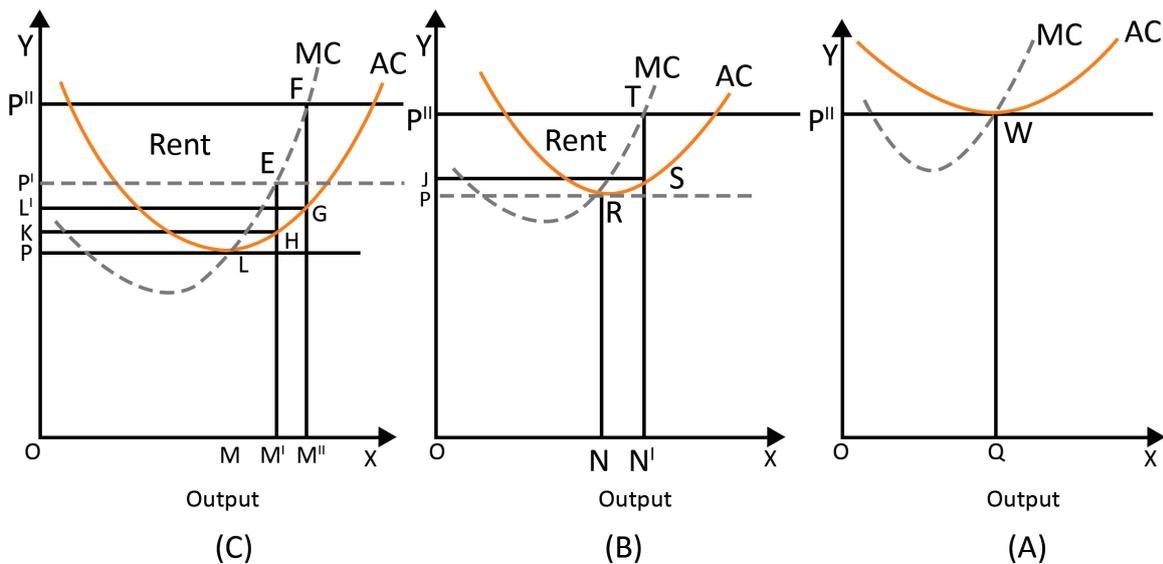


Fig. 1.3.3 Differential Rent

- Expansion of agriculture via intensive cultivation in fertile land and extensive cultivation in less fertile land

the  $AR = MR = P$ . The equilibrium condition is  $MC = MR$ . The first panel shows the rent arising in the most fertile land, Grade C. Second is Grade B, and third is Grade A. When farmers are at the initial phase, they choose fertile land, C. The equilibrium is at L when MC is equal to MR (which is equal to P). The price of corn is P, and the level of output produced will be OM amount. When demand for corn increases, farmers will start producing on lesser fertile land, too, say, land B. In Grade C land, it will be put for intensive cultivation, i.e., the land will be under cultivation with a greater number of labourers. When the number of labourers increases, and output increases ( $OM^1$ ), the marginal cost increases, and the equilibrium position will not be at the lowest point of the average cost curve. The price rises to accommodate the increased cost and increase in demand to  $P^1$ . Then, the equilibrium is at E. Here, the average cost becomes  $OM^1HK$ . However, the price is  $OP^1$  and the total output or return is  $OM^1EP^1$ . The difference between output and cost is  $KHEP^1$ . For grade B land at  $OP^1$  price, the MC is equal to MR at the lowest point on the average cost curve. Here, price is equal to cost, and rent is zero at ON output. During this stage of cultivation, grade B is marginal land with no rent, and grade C is fertile land put for intensive cultivation.

- Rent is surplus over the cost of production

When demand for corn increases further, farmers choose to cultivate in even less fertile land, say grade A. The increased demand for corn increases the price of the corn to  $OP^{11}$ . With the higher price, it is possible to cover the increased cost of cultivation in grade A. Regarding grades C and B, it is possible to add more labourers and put these lands for intensive cultivation. With intensive cultivation, grade C land produces  $OM^{11}$  output at  $P^{11}$  price. In the case of grade B land, the amount of output increases to  $ON^1$ . With a higher price,  $P^{11}$ , both grade C and B land have rent. The shaded area is the rent for Grade C, and B. Land A has no rent, and it is the marginal land when the price is  $P^{11}$ . From this figure, it is clear that rent is higher for the fertile land, grade C, than grade B. Rent is the surplus over the cost of production. In the fertile land, since the cost of production is lesser than grade B, with  $OP^{11}$  price, the surplus is higher for grade C than grade B. For Ricardian theory, rent is not part of the cost of production but a surplus over the cost of production. So, rent is not price-determining but price determined as the price of the corn determines the rent.

## Evaluation of Ricardian Theory

Following is the critical evaluation of the Ricardian theory of rent:

- Similarity with modern ideas – demand for land is derived demand, forces of demand and supply determine rent
- Ricardo didn't think of alternative uses of land and predicted stagnant growth

1. Like modern economists, Ricardo also determined rent in terms of demand and supply. Though he used differential rent, the forces of demand and supply play a role in determining rent.
2. For Ricardo, too, the demand for land is derived from demand, i.e., the demand is derived from demand for the produce of the land.
3. Ricardo did not consider various uses of land. As he considered single use for land and land as a whole for the society, rent is price determined and not price determining. However, since there are alternative uses for land, individual industries make payments to land to keep it from being transferred to other industries. This payment is a part of the supply price or cost of production. In the case of land, as it has alternative uses in real life, payment for land, i.e., rent, is a part of the supply price or cost of production. So, modern economists argue that rent is price-determining and not price determined as expected by Ricardo.
4. Using the theory of rent, Ricardo explained the process of economic growth till all the idle land is used and predicted stagnant economic growth. However, economic growth is not stagnant, as per modern economists.

### 1.3.1.2 Quasi-Rent

- Payment for short-run fixed factors

Quasi-rent is the extension of Ricardian rent. It is the payment of fixed factors such as machinery and buildings. These factors are inelastic in supply during short periods, and quasi-rent is the earning of these capital equipment during the short run. Since these factors are fixed in supply, at least for a short period, the payment for these factors is similar to rent. However, the supply is not fixed in the long run as land. For the capital equipment, the supply can be made elastic in the long run. Hence, payment for short-run fixed factors is called quasi-rent. Alfred Marshall introduced the concept of quasi-rent.

As capital equipment is fixed in the short run, with an increase in demand, there will be rent for these equipment. But in the

- Quasi rent = TR – TVC

long run, it is possible to increase supply in response to the increase in demand leading to no rent in the future. The transfer earning, which is the earning on alternative use, is zero in the short run. So, all the earnings are rent in the short run. Here, too, rent is surplus over the cost of production. i.e., quasi-rent is Total Revenue – Total Variable Cost. The following figure shows the size of quasi rent.

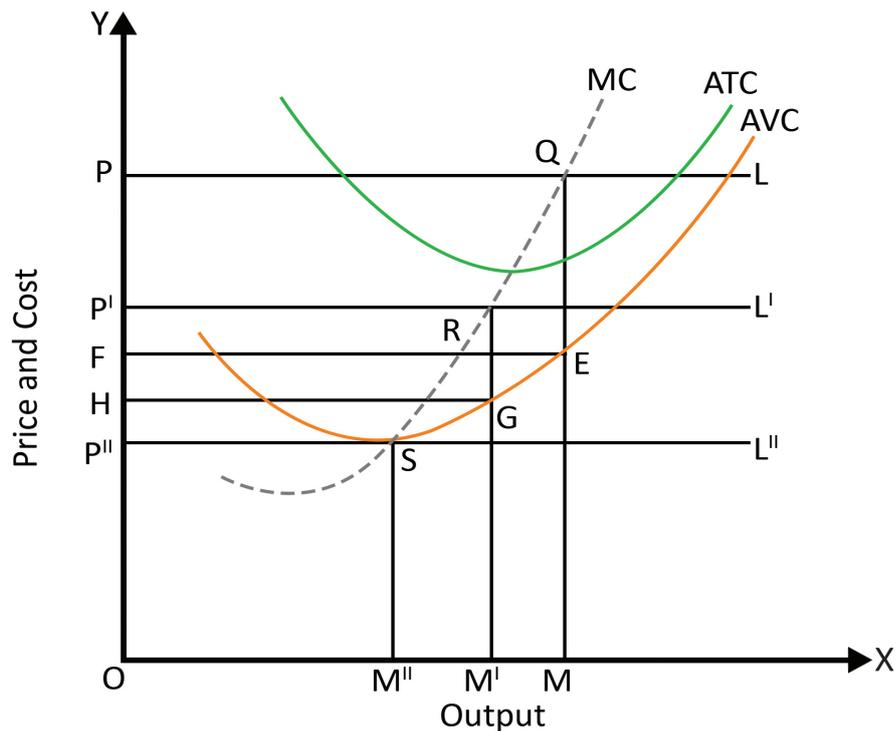


Fig 1.3.3 Quasi-rent

In the figure, ATC is the Average Total Cost curve, and AVC is the Average Variable Cost curve. In the short run, with greater demand for capital equipment, the price for the equipment is higher, as shown by OP. So, AR = MR = D = P is the PL line. The equilibrium is at MR = MC at Q. Then, the equilibrium output is OM. The total output is shown by OMQP, and the total variable cost is OMEF. The quasi rent, which is the surplus over cost of production or total revenue minus total variable cost, is shown by  $OMQP - OMEF = FEQP$ . This is the short-run earning of fixed capital equipment. Suppose the price falls to  $OP'$ , then the AR = MR = D = P is  $P' L'$  line. The equilibrium will be at R with  $OM'$  output. Total output will be  $OM'RP'$  and total variable cost will be  $OM'GH$ , making

- Surplus above average variable cost

a quasi rent equal to HGRP<sup>1</sup>. When the price further falls to P<sup>11</sup>, the MC = MR is at S, which is the lowest point on the ATC curve. At the lowest point on ATC, we know that the total variable cost is equal to the total cost; hence, there is no quasi rent.

## Summarised Overview

Rent is basically determined by the forces of demand and supply for land. Land is fixed and inelastic in supply. Therefore, rent is determined based on the demand for land. Ricardian theory of rent is based on various assumptions, viz., inelastic supply of land, single use of land etc. According to Ricardo, “rent is that portion of the produce of the earth which is paid to the landlords for the use of the original and indestructible power of soil”. Ricardo discussed scarcity and differential rent. Scarcity rent is defined in terms of scarcity of land when demand exceeds supply. Differential rent is based on the difference in the quality of land. As per Ricardo, farmers choose fertile land first and then move to less fertile land. Demand for land is based on the demand for corn, for which the land is being used. So, demand for land is derived demand. Hence, rent is price determined and not price determining as it is not a factor of cost of production. According to Ricardo, rent is the surplus over the cost of production. The extension of the concept of Ricardian rent is quasi-rent. It is the payment for fixed factors in the short-run. Quasi-rent is also considered as the surplus over the cost of production. Hence, quasi-rent is total output minus total variable cost.

## Assignments

1. “Rent is considered as the payment for all fixed factors, and not just land”, Elucidate.
2. Explain the Ricardian theory of rent using scarcity and differential rent
3. Discuss how the quasi rent is the extension of the concept of Ricardian rent.

## Suggested Reading

1. Salvatore, D. (2003), *Microeconomics -Theory and Applications* (Fourth Edition), Oxford University Press.

## Reference

1. Dwivedi, D.N. (2012). *Microeconomics: Theory and Applications* (Second Edition). Vikas Publishing House Pvt. Ltd
2. Koutsoyiannis, A. (1990). *Modern Microeconomics*. Macmillan
3. Verma K.N. (2017), *Microeconomic Theory*, Vishal Publishing Co.



## UNIT 4

# Theories of Interest

### Learning Outcomes

After completing this unit, learner will be able to:

- understand the Classical theory of interest
- distinguish between different factors of loanable fund
- examine the Keynesian theory of interest

### Background

Interest is the reward for the factor of production, capital. For the production process, the capital used is received mainly from the banking system. However, there are unorganised sector lending of capital where the interest payment is comparatively higher. Under economic theory, with respect to capital and interest rate, we deal with interest rate determined by different economic thoughts. At graduate level, you might have dealt with interest rates determined under classical, neo-classical, and Keynesian models. In all these models, the interest is determined by the demand and supply of money.

For classicals, savings and investments form the important factors under consideration. Neo-classicals deal with loanable funds to determine interest rates whereas for Keynesians, the interest rate is determined based on the preference for keeping liquid cash with the people. For Keynesians, the liquidity preference is a monetary phenomenon. Let us explain these models in this unit.

### Keywords

Capital, Interest, Savings, Investment, Hoardings, Liquidity, Transactive Motive, Speculative Motive

## Discussion

### 1.4.1 Theories of Interest

- Capital – financing production
- Interest – reward for capital

In common terms, interest is referred to as the payment to the borrowed money. Money may be borrowed for investment, consumption, repaying debts, etc. This borrowed money when used in the production process, can be called capital. Capital is one of the most important factors of production. It can be used to finance the various factors involved in production. The capital is used to purchase the land, construct the plant, buy machinery, and make all arrangements needed for the production process. Here, capital can be divided into two types, viz., physical capital and financial capital. Physical capital refers to physical assets such as machineries involved in the production, and financial capital refers to finances involved in the production. Interest is the payment or reward for capital. Suppose interest is the reward for physical capital, since the physical capital is brought using financial capital. In that case, interest is the reward for money invested in physical capital, i.e., the financial capital.

- Interest determined by demand and supply of money

Interest is the payment for the capital. Determination of interest is different under various theories of interest. There are three main theories of interest: Classical theory of interest, Neo-classical theory, and Keynesian theory of interest. Since interest is the reward for the capital, mainly in financial or monetary terms, it is considered determined by the demand for and supply of money. Each theory has different factors under the demand and supply of money to determine the interest.

- Classicals – demand for and supply of money, Neoclassicals – loanable funds, Keynesian – Monetary factors

For Classicals, the interest may be mostly determined by the supply of money. Within classical theory, concepts such as abstinence and time preference stress the role of the supply of money in determining interest. However, there are versions which give importance to the productivity of the capital, resulting in importance to demand for money. Under Neo-classical theory, it is the demand and supply of loanable funds which determines the interest. Both monetary and non-monetary factors are considered under loanable funds. For the Keynesian theory of interest, interest is purely a monetary phenomenon.

Let us explain the theories in detail.

### 1.4.1.1 Classical Theory of Interest

- Interest – equality between saving and investment

Generally, interest is determined by the demand for and supply of money. For Classical, the demand for money comes from the demand for investment and the supply of money comes from the saving of money by individuals and businesses. The equality between saving and investment determines the interest rate. For classicals, since they believe in full employment conditions, resources are also fully employed. Here, all savings are invested at the market interest rate. Equality between saving and investment happens, and the interest rate is determined by this equality of saving and investment.

- Price of sacrifice or price of waiting for saved money

The supply of money comes from the savings of people. People save money by not spending it on consumption. Suppose you save rupees 5000 every month from your salary. It reveals that you choose not to spend the rupees 5000 for any consumption. So, for Classical, savings involve the sacrifice of abstinence. The interest rate is considered as the price for the sacrifice. However, this abstinence is criticised by many on the grounds that the rich is able to save without any sacrifice, and hence, interest is not the price for sacrifice. From another angle, abstinence is considered a postponement of current consumption for future consumption. This is put forward by Marshall. Hence, interest is the price of waiting for the money to be received in the future. These are ideas under the version of interest as a price for abstinence or waiting.

- Saving is interest elastic

It is important to note that saving is interest elastic. Supply of savings changes positively to the changes in interest rate. i.e., when the interest rate increases, savings increase, and when the interest rate falls, savings also fall. As interest is the reward for savings, when the reward increases, savings also increase. When representing savings and interest rates graphically, the positive relation can be shown by an upward sloping curve.

- Inverse relation between interest and investment

When referring to the demand for money, it is mainly for investment. The demand for investment comes from entrepreneurs who are making businesses. They use the money to create capital goods, which in turn can be used to make further goods. The capital goods have a marginal revenue productivity. It is an addition to total revenue. However, the capital goods stay for a particular period, but with the cost of depreciation and maintenance cost. We know that the marginal returns fall with additional units of capital

goods, and the relation between interest rate and investment is inverse, represented in the downward sloped curve. The below figure shows the determination of interest using the supply and demand for money.

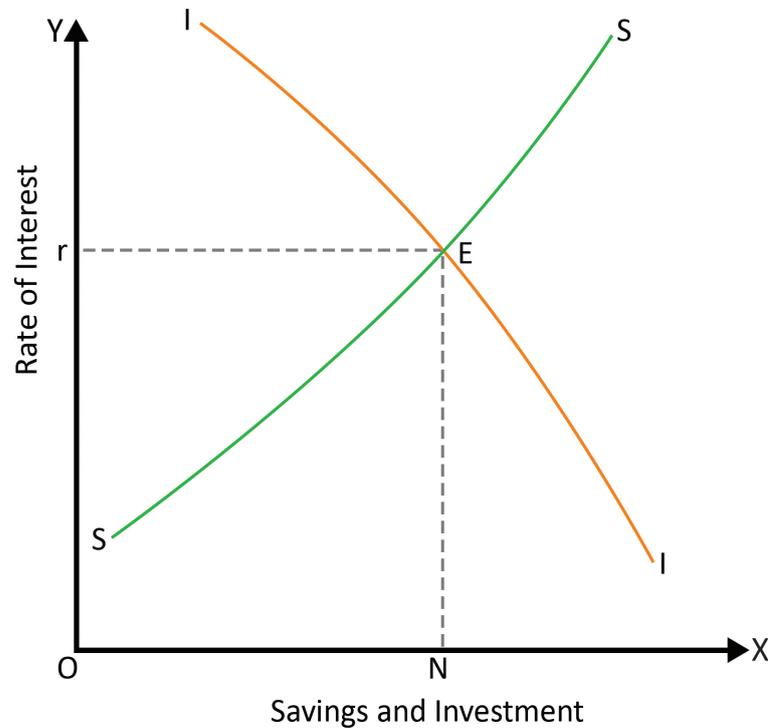


Fig 1.4.1 Determination of Interest under Classical Theory

- Equilibrium interest at investment equals savings

In the figure, the investment, which is the demand for money, is inversely related to interest rate or negatively sloped. Saving, which is the supply of money, is positively related to interest rate. At the intersection of demand and supply of money, that is, the intersection of saving and investment determines the level of interest. Here,  $r$  is the equilibrium interest rate at which saving and investment are equal ( $ON$  level).

### Evaluation of Classical Theory of Interest

Though interest is determined at the intersection of demand for and supply of money, the factors determining demand and supply are different for different theories. This has resulted in many criticisms of the theories. Following are the criticisms of the Classical theory of interest.

- Role of income and having present consumption ignored

1. The Classical theory believed in full employment. This is taken as the reason for the automatic equilibrium of saving and investment. Full employment of resources and flexibility in changes in interest rate to equilibrate saving and investment is not smooth in real situations.
2. The Classics did not give importance to the role of income in affecting savings and investments.
3. The assumption that a fall in consumption increases savings and, thereby, increases investment is not realistic. Investment in capital goods produces goods that need to be consumed for further production. If consumption falls in the present time, low consumption of goods reduces investment needs, which in turn reduces investments in future.
4. Classical theory did not mention the past hoarding that can be used as a source of savings instead of current income.

### 1.4.1.2 Neo-Classical Theory of Interest

- Demand and supply of loanable funds

The Neo-Classical theory of interest is also known as the loanable fund theory. The theory is put forward by Wicksell, Ohlin, Lindahl, Viner, and Robertson. According to Neo-Classicals, the interest rate is determined by the demand and supply of loanable funds. Here, monetary and non-monetary factors are considered as the factors affecting demand and supply. Demand for loanable funds and supply of loanable funds are the aggregates of many factors. Let us see the factors.

#### Supply of Loanable Funds

Supply of loanable funds includes savings, dishoardings, disinvestments, and bank credit.

- Positive function of interest

- **Savings:** We have already learned that savings form an important source of money supply. Under loanable funds, too, it is an important factor. Savings are generated through the money kept by individuals and businesses by not having present consumption. Savings can also be seen as a function of the interest rate. Savings increase when the interest rate rises and decrease when the interest rate falls. Individuals save more with higher interest rates, given their income. Businesses facing higher interest rates use their savings to meet funding needs instead of taking loans. Though this saving of entrepreneurs does not come to banking, it affects the interest rate as the saved fund is used as a substitute for loans. Since savings

have a positive relation with interest rates, the supply of savings slopes upwards.

- Inverse function of interest

- Credit creation via secondary deposits

- Positively related to interest

- **Dishoarding:** Accumulated savings of an individual from the past forms the hoarding. People prefer liquid money with them, so they keep idle cash balances in their hands. This keeping of idle cash balances is a function of interest rate. People hoard money when the interest rate is low, or the bond price is high. When interest rate increases or bond prices fall, people dishoard their past savings. When people keep money in hand, they lose the interest rate that could have been earned if deposited in the bank. So, the interest rate is the money forgone as a result of hoarding or holding money. When interest rates increase, the cost of holding money increases, and people dishoard money. This increases the supply of loanable funds. Conversely, a low rate of interest reduces the cost of holding idle cash balances. People will be reluctant to part with money. This reduces the supply of loanable funds.
- **Bank Credit:** Bank credit is an important source of supply of loanable funds. When people demand money in the form of loans, banks advance the loans in the form of secondary deposits. Primary deposits are saving deposits made by customers. Secondary deposits are created when loans are advanced to customers. Banks create credit through the generation of secondary deposits to advance loans. The banking system influences the supply of loanable funds through the purchase and sale of securities, too.
- **Disinvestment:** Investment creates fixed and working capital. When there are structural changes in the economy, entrepreneurs reduce investment in industries that have low business expectations. The rate of return from physical capital may be lower than the existing monetary interest rate. So, the money reserved for funding inventories will be diverted to the supply of loanable funds. Moreover, with a higher interest rate, entrepreneurs usually resort to more disinvestment. So, disinvestment is also a positive function of the rate of interest.

### Demand for Loanable Funds

In the neo-classical model, in addition to the demand for investment as part of the demand for funds, the demand for funds for consumption and hoarding money forms a major part of the demand for loanable funds.

- Inversely related to interest

- Low interest rates boost borrowing

- Hoarding money for investing in bonds

- **Investment:** Here, investment refers to creating new capital and inventory equipment via the borrowings of business enterprises. Inventories are kept to address the wear and tear or depreciation of the existing physical capital. Investment is inversely related to interest rate. Investment increases when the rate of interest or cost of borrowing falls and vice-versa. It is interest elastic. Investment demand depends on the marginal revenue from the use of capital goods. When the stock of capital goods increases, marginal revenue productivity falls, leading to an inverse relation.
- **Consumption or Dissaving:** Unlike Classical theory, which stresses only the demand for investment while addressing the demand for funds, in real life, there are instances when people borrow money for consumption. They borrow when their actual expenditure rises above their disposable income. Demand for funds arises to meet expenditures on residential construction, vehicles, furniture, travel expenses, etc. Nowadays, people borrow money to meet expenditures on health and education. The price of borrowing is the rate of interest. When interest rates are low, individuals increase their borrowing to boost consumption and reduce borrowing when the rate of interest is high. Therefore, the consumption demand for loanable funds is downward sloping showing a negative relation with the rate of interest.
- **Hoarding:** Demand for loanable funds happens for hoarding, too. Demand for hoarding is inversely related to interest. People demand money to hoard when the interest rate is low so that the cost of forgoing interest is low. They keep idle cash balances to invest in securities. When the interest rate increases, individuals deposit the cash in a bank to receive a high return. In terms of securities or bonds, the bond price is inversely related to the rate of interest. When the interest rate is high, the bond price will be low, leading to a rational individual purchasing a bond so that a capital gain can be reaped while selling the bond when the bond price reaches its peak.

The demand for and supply of loanable funds are explained in detail. The interest is determined at the intersection of the aggregate demand for and supply of loanable funds. The aggregate demand for loanable funds (DL) is derived by the horizontal summation of factors of demand for loanable funds, viz. the investment (I), dissaving (DS), and the hoarding (H).

The aggregate supply of loanable funds (SL) is derived by the summation of factors of supply of loanable funds, viz. the saving (S), bank credit (BC), dishoarding (DH), and disinvestment (DI). The rate of interest is determined by the intersection of aggregate demand for and supply of loanable funds.

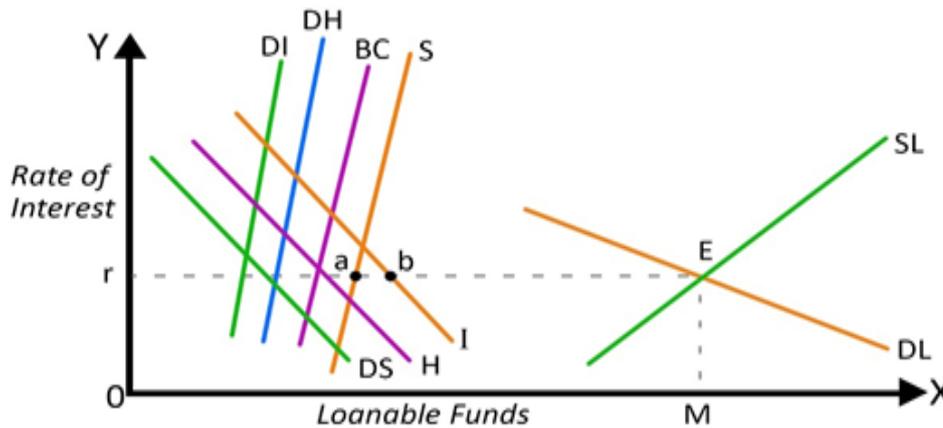


Fig 1.4.2 Determination of Interest under Loanable Funds Theory

- Saving and investment equality does not determine interest rate

DL is the aggregate demand for loanable funds derived through the horizontal summation of factors under demand for funds. SL is the aggregate supply of loanable funds. The equilibrium point is E. The Equilibrium interest rate is 'Or', and the equilibrium loanable fund is 'OM'. From the figure, it is clear that, at the equilibrium interest rate, saving,  $r_a$  is not equal to the investment,  $r_b$ . So, unlike the classicals, under neoclassical theory, equilibrium interest is not attained at the intersection of saving and investment. Here, investment is greater than saving. Hence, income increases. With the increase in income, the savings and aggregate supply of loanable funds increase. This will change the equilibrium rate of interest. Therefore, a stable rate of interest will be achieved only when the equilibrium rate of interest derived by the intersection of aggregate demand for and supply of loanable funds equates to savings and investment.

### Critical Appraisal of Loanable Funds Theory

The loanable fund theory of interest is superior in the sense that it has taken into consideration many relevant factors that determine an equilibrium rate of interest. The theory is an improvement upon the classical theory of interest. However

Keynesian economists have criticised the theory for many reasons. They are:

**A. The role of hoarding in generating demand for the loanable fund is unsure**

Keynesians believe that the overall hoarding cannot be increased or decreased in the economy as long as the quantity of money remains the same. Since the money is constant, the hoarding of one person will be offset by the dishoarding of another person.

**B. Interest rate is indeterminate:**

Saving is a positive function of income. In loanable fund theory, saving forms the important source of supply of loanable funds. Since saving changes with changes in income, the supply of loanable funds also changes. So, every time a change in income is experienced in the economy, the supply of loanable funds changes, which makes the rate of interest indeterminate.

**C. Based on Full employment:**

The loanable fund theory is a smooth movement from Classical theory to Keynesian theories of interest. The theory adopted the concepts of saving and investment from classical theory, and the concepts of hoarding and dishoarding that led to the liquidity preference theory of Keynes.

**1.4.1.3 Keynesian Liquidity Preference Theory of Interest**

Keynesian theory of interest is based on the theory of demand for money. Keynes's views of interest rates are given in his book, 'The General Theory of Employment, Interest and Money. According to Keynes, 'interest is the reward for parting with liquidity'. Liquidity preference refers to a preference for liquid money or cash in hand. People keep money or liquid cash with them for three reasons : transaction motive, precautionary motive, and speculative motive. Nowadays, with online payment mechanisms and the penetration of Google Pay, Paytm, and other UPI payment methods, real cash is kept less. However, these mechanisms ensure the liquidity of cash at the disposal. The following are three motives for preferring liquidity.

**a. Transaction Motive:** Transaction motive is meant to help individuals and business firms meet their daily expenses.

- Role of hoarding unsure, interest rate indeterminate, unrealistic full employment assumption

- Interest is reward for parting liquidity

- Meeting daily expenditures

This is to bridge the interval between the receipt of income and daily expenditures. We know that people receive money mostly on a monthly basis. Some receive it on a weekly or daily basis. When income is received at intervals, and expenditures are to be met daily, we need some amount of money at hand to make these expenditures. This is the transaction motive. The amount of money that people keep for transaction motives depends on factors such as interval of income receipt, size of income, and available payment mechanisms. The transaction demand for money is a direct function of income.

- Cover uncertain situations

**b. Precautionary Motive:** In life, it is real that we face uncertain situations. Most of the time, uncertain situations require spending money to deal with the situation. People keep the money for security purposes to cover the uncertainty. The uncertainties may arise in the form of sickness, unemployment, accident, and so on. A rational individual will keep some money to face such situations. The precautionary motive is also a direct function of income.

- Invest in bonds

**c. Speculative Motive:** Speculative demand for money arises from the asset function of money. According to Keynes, money is considered an asset along with other financial assets. People keep idle money to spend it on bonds. When the interest rate is high, and the bond price is low, people purchase bonds and sell the bonds when the bond price is at its peak. This generates a capital gain. The bond price and rate of interest are inversely related. When the rate of interest is high, bond prices will be low. Then, individuals purchase the bond and sell it when the interest rate is low, or the bond price is high. People keep the money until the bond price falls the next time. Hence, the speculative motive is an inverse function of the rate of interest.

The total demand for money or liquidity preference can be written as,

$$L = f(Y, r)$$

where L is liquidity preference; Y is income, and 'r' is the rate of interest. Transaction and precautionary demand are a function of income, and speculative demand is a function of interest rate. The transaction demand for money is given for a particular period. Hence, the liquidity preference is an inverse function of the rate of interest.

- $L = f(Y, r)$

The demand for money or liquidity preference is graphically represented below.

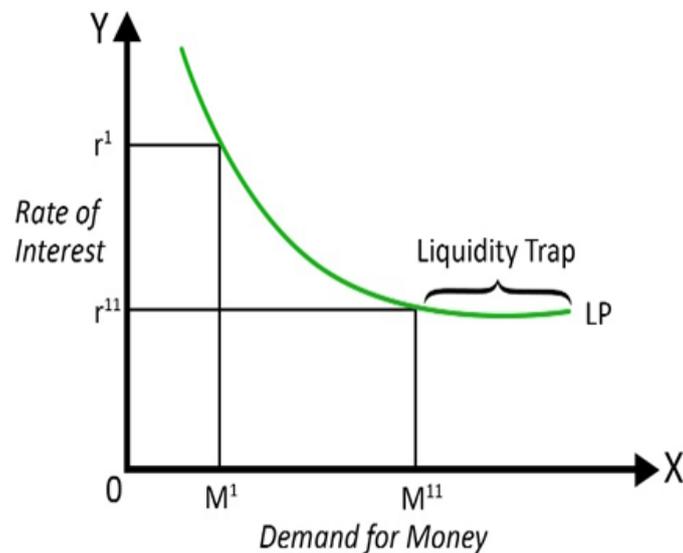


Fig 1.4.3 Liquidity Preference

The demand for money curve or the Liquidity Preference Curve is negatively sloped, showing the inverse function of demand for money and the rate of interest. LP is the liquidity preference curve at a very low interest rate where, the speculative demand for money schedule becomes nearly horizontal. When the rate of interest is high, that is, ' $r^1$ ', the bond price is low. So, individuals spend their money on bonds. So, the demand for money or idle cash with the hand will be low, as shown by ' $OM^1$ '. When the rate of interest is low, ' $r^{11}$ ', the bond price will be high. Individuals sell their bonds to reap the capital gain. This money from the sale of bonds will be kept by people until a further fall in bond price or a rise in the rate of interest. So, the demand for money becomes high, ' $OM^{11}$ ' at a low rate of interest, ' $r^{11}$ '. See, at the lowest rate of interest, ' $r^{11}$ ', the demand for money or liquidity preference is a hundred percent. This is shown as a liquidity trap. At the lowest possible interest rate, people keep all the cash. Money remaining idle is referred to as a liquidity trap. In this position, any change in interest rate does not change the demand for money.

### Determination of Rate of Interest in Liquidity Preference Theory

The equilibrium rate of interest is determined by the

intersection of demand for and supply of money.

$$M_d = M_s$$

Here,  $M_d$  is the demand for money, and  $M_s$  is the supply of money

- $M_d = M_s$

We know that the demand for money is a function of three motives, given as the function of income and interest rate. The supply of money is determined exogenously by the central bank of the nation. It is fixed for the short-run.

The following figure shows the determination of interest rate.

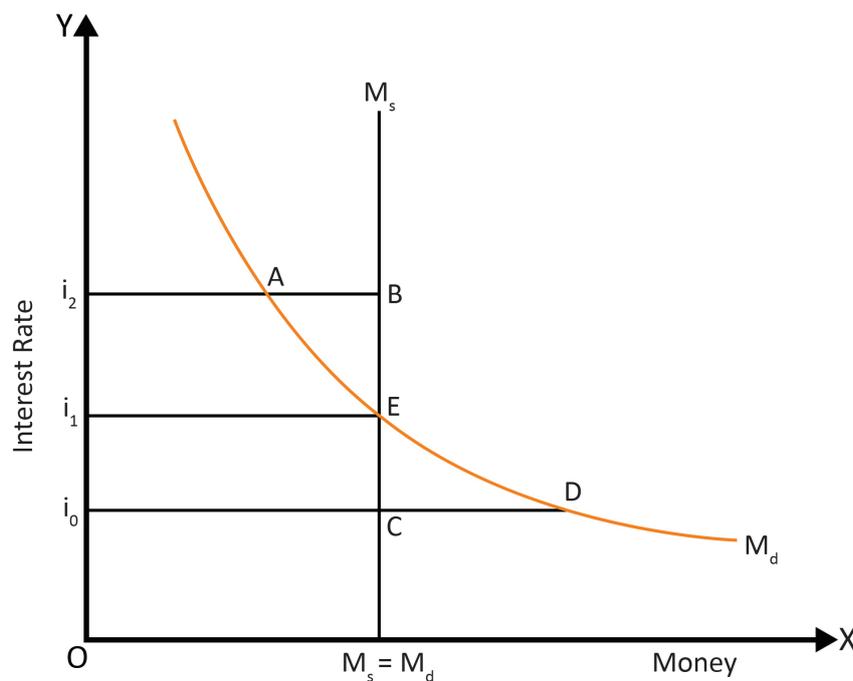


Fig 1.4.4 Determination of Interest rate in Keynesian Model

- Equilibrium changes when demand or supply factors change

In the figure,  $M_s$  is the supply of money curve, and  $M_d$  is the demand for money curve. The supply curve is vertical as it is fixed in the short run. The equilibrium interest rate is  $i_1$  at E when the demand and supply of money are equal. For any other interest rate, the demand and supply of money are not equal. The equilibrium interest rate changes when the demand for money or supply of money changes.

Let us see the change in demand for and supply of money and the resultant change in interest rate.

The figure given below shows the equilibrium rate of interest in the Keynesian theory of Liquidity preference.

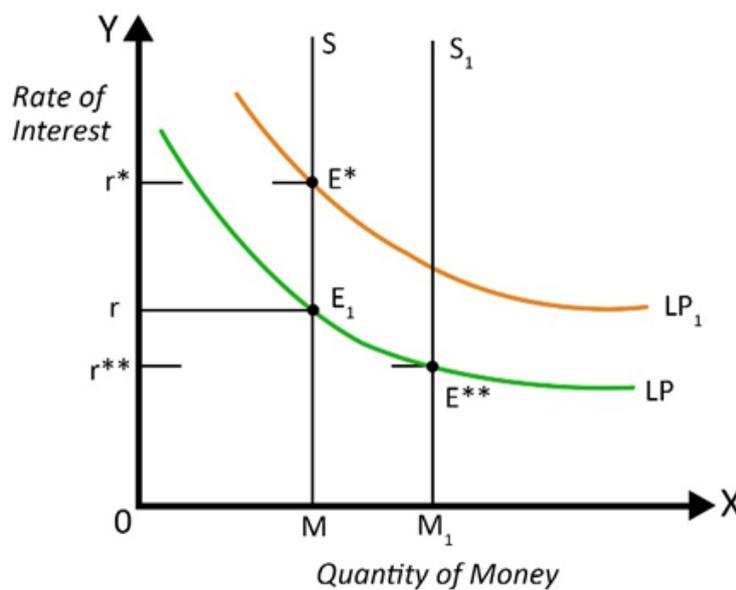


Fig 1.4.5 Determination of Equilibrium Rate of Interest under Theory of Liquidity Preference

- Change in demand and supply of money changes equilibrium interest

In the figure, LP is the demand for money, and S is the supply of money. Since the supply of money is determined exogenously by the Central Bank of a nation, it is fixed in the short run and shown vertically. The equilibrium rate of interest is  $r$  the amount of money is  $OM$ , and the equilibrium is at  $E_1$ . Given the supply of money, suppose the demand for money increases to  $LP_1$ , which shifts the equilibrium to  $E_*$  and the rate of interest to a higher point,  $r_*$ . Note that there will be no change in the equilibrium amount of money with a constant supply of money. With no change in the money supply, the interest rate must rise significantly to equilibrate the increased demand for money with the constant money supply. Now, suppose the demand for money is given; a change in the supply of money to  $S_1$  shifts equilibrium to a lower level,  $E^{**}$ . The rate of interest falls to  $r^{**}$  and the amount of money increases to  $M_1$ . The Keynesian Theory of interest is explained in terms of monetary factors such as the rate of interest and money. Hence, the theory is a monetary theory of interest.

## Evaluation of Liquidity Preference Theory

- Ignored the role of saving

- Ignore the role of money in generating instabilities

- For Keynes, interest is the reward for parting with liquidity and not for saving. Keynes did not consider the fact that the liquid cash at hand is a result of saving for which a reward must be given. Keynes's propensity to consume is related to saving. The rate of interest is linked to saving.
- The equilibrium rate of interest is determined by the demand and supply of money. Given the supply of money, the transaction demand for money is a function of income. So, the indeterminate concept in the Classical and the Loanable Fund Theory of Interest applies to the Keynes Liquidity Preference Theory of Interest.

Even with these criticisms, Keynesian theory is superior. Adding the store of value function of money, which was not recognised by the Classical economists, is an advantage.

## Summarised Overview

Capital is one of the most important factors of production. It can be used to finance the various factors involved in production. Interest is the reward for capital. Interest rate is determined by the demand for and supply of money. The determination of interest rate is explained under three important models : Classical theory, Neo-Classical theory, and Keynesian theory. For Classicals, the demand for money comes from the demand for investment, and the supply of money comes from the saving of money by individuals and businesses. The equality between saving and investment determines the interest rate. Under the Neo-Classical model, the interest rate is determined by the intersection of demand for and supply of loanable funds. Demand for loanable funds includes investment, hoardings, and borrowings. The supply of loanable funds includes savings, dishoardings, disinvestment, and bank credit. The aggregate demand and supply of loanable funds are generated through the horizontal summation of the respective factors.

## Assignments

1. Explain Classical Theory of Interest based on Demand and Supply of Capital.
2. Discuss the factors affecting demand for and supply of loanable funds. Explain how interest rate is determined here.
3. Elucidate on Keynesian Theory of interest.

## Suggested Reading

1. Snyder, Christopher, Nicholson, Walter. (2012). *Microeconomic Theory: basic principles and Extension* (Ed. 11th) United State: Cengage Learning.
2. Verma K.N. (2017), *Microeconomic Theory*, Vishal Publishing Co.

## Reference

1. Dwivedi, D.N. (2012). *Microeconomics: Theory and Applications* (Second Edition). Vikas Publishing House Pvt. Ltd
2. Froyen T. Richard (2005), *Macroeconomics* (Second Edition), Pearson Education, Asia

## UNIT 5

# Profit

### Learning Outcomes

After completing this unit, learner will be able to:

- distinguish between different theories of profit
- understand how the dynamic nature of the economy is considered under profit determination
- explain risk and uncertainty as factors explaining the determination of profit

### Background

An entrepreneur is a person who organises the production process by hiring all the other factors of production. The practice of organising the production process is called entrepreneurship. Profit is the reward for this entrepreneurship. The path to entrepreneurship is not a cakewalk. An entrepreneur faces many hurdles on her journey. There are chances of making incorrect policy decisions related to the size of the output produced or the price of the output. Also, the downward movement of the economy due to pandemics like COVID-19, general recession, war, etc., pose disruptions in the production process. So, entrepreneurs are tasked to face many risks and uncertainties. Profit is considered a reward for taking on such tasks. There are many theories explaining the relationship between the functions of an entrepreneur and profit. The following sections give an account of the theories of profit.

### Keywords

Innovations, Dynamic Economy, Risk, Uncertainty

## Discussion

- Profit is the reward for entrepreneurship

### 1.5.1 Profit

Entrepreneurs are responsible for making decisions regarding the level of output to produce, the price of goods, and the stock of inventories to keep. There are risks associated with such decisions. Profit is considered as the reward for taking such risks. Innovation is an important activity carried out by entrepreneurs. Schumpeter believed profit is the reward for doing innovation. To F. H. Knight, profit is connected with the function an entrepreneur takes in terms of dealing with the uncertainties of the economy. According to J.M. Keynes, profit is related to changes in the general price level. Therefore, profit is determined by many factors. Let us go through some of the important theories of profit.

#### 1.5.1.1 Dynamic Theory of Profit

- Profit as reward for dealing dynamic changes in the economy

This theory is introduced by J. B. Clark. According to Clark, profit is generated as a result of dynamic changes in the economy. An entrepreneur has to bear risk due to dynamic changes in the economy. So, the individual must be awarded profit over and above the cost of production as a reward for dealing with the dynamic changes. So, profit is present only in a dynamic economy, and not in a static economy. The dynamic changes in the economy may be either from the demand side or the supply side.

Following are some of the dynamic changes identified by Clark:

They are changes in

1. Methods of production
2. Population and resultant change in demand for goods
3. Taste and preference of the economy.
4. Stock of capital.
5. Business organisation.
6. Spending habits of people.

- Dynamic economy

These dynamic changes in the economy enhances productivity in various fields and cause reduction in the cost of production. Some of the changes may be a result of innovations in the

- Innovations create dynamic changes
- Dynamic changes may be exogenous

economy, some are exogenous changes. Change in method of production, changes in business organisations may be a result of innovations whereas, changes in taste and preferences, population may be exogenous changes. The dynamic changes bring a resultant increase in price over the average cost of production. This rise in price leads to profit.

- Anticipated changes, no accurate measurement, profit as a reward for uncertainty

The theory is criticised on the basis that profit arises from dynamic changes that are not anticipated. But, some of the dynamic changes mentioned under the theory are anticipated, hence not going to produce profit. Moreover, it is difficult to exactly measure the dynamic changes. Also, though firms face same amount of changes, the profit generate may be different for firms. As per Knight, profit is a reward for uncertainty, not simply the dynamic changes. Even the number of changes identified by Clark are limited that it does not capture all possible changes in the economy.

- Innovation - Commercial use of scientific discovery

### 1.5.1.2 Schumpeter's Theory of Profits

Schumpeter's theory of profit is based on the innovations in the economy. Therefore, the theory is also known as innovation theory of profit. Innovation related to technological advancement in the economy brought by entrepreneurs. Profit is the reward for this innovation in the economy. Innovation refers to commercial use of scientific or technical inventions for ideas related to business, marketing, and management. So, Innovation means applying a scientific discovery or invention for economic purposes.

Following are the kinds of innovations in the economy.

- Introduction of a new product.
- Discovery of a new or cheap method of production.
- Introduction of new machinery.
- Discovery of a new market.
- Introduction of new design or product varieties.
- Finding out a new source of energy.
- Formation of a new method of organising the firm.
- Discovery of new sources of raw materials.
- Finding out a new method of advertising.

- Innovation generates demand and reduction in cost of production

Innovations generate greater demand for certain goods. It also reduces cost of production. Increased demand allows rise in price which in turn leads to increase in profit. With respect to cost of production, fall in cost of production due to innovations and technological changes too increases profit. But, it is important to see that the profit generated attracts more firms into the industry causing reduction in profit in the long run. However, new inventions can generate new profit in the economy, and the relation may continue.

### 1.5.1.3 Risk Theory of Profit

- Profit - reward for risk

Risk theory of profit is introduced by H. B.Hawley. He explained that the factors of production other than entrepreneur receives contractual payment in terms of getting wages for labour, rent for land, and interest for capital. These factors do not under take any risk of business. But, entrepreneur has to bear risk in the business for which a reward is given as profit. The risk in the business may be due to reasons including fire, floods, fall in demand, technological change, lock outs, and so on. Profit is the reward for dealing with such risks by the entrepreneur.

- Compensation for dealing many risks while operating business

Hawley identified risk in terms of replacement, obsolescence, uncertainty, and risk proper. Though there may be loss due to such risks, it is possible to expect loss and make considerations in cost to find solutions for risks associated with such loss. As the entrepreneur has to bear such risks while operating business, profit is rewarded as a compensation. Hawley regarded that profit has a proportional relation with the amount of risk beared.

- Risk and profit are not proportional
- Profit as a reward for reducing risk

Risk is not the only factor determining profit. There are uncertainties in business that are not anticipated. Hawley has not considered such losses. Also, there is no proportional relation between risk and profit. There are situations that business facing lower risk reap higher profit and those facing higher risk receive little profit. So, proportional relation between risk and profit is not true. It is also opinioned that profit is not a reward for bearing risk, but for reducing risk. The companies those are able to reduce the risk in business may be able to reap higher profit.

### 1.5.1.4 Uncertainty Theory of Profits

- Profit – reward for bearing uncertainty

The uncertainty theory of profit is introduced by F. H. Knight in his famous book, 'Risk, Uncertainty, and Profit'. According to Knight, profit is a reward for bearing uncertainty. For him, risk-bearing theory is insufficient in explaining the origin of profit. He separated risk and uncertainty, as well as predictable and non-predictable changes in the economy, to explain the origin of profit. As per Knight, there are two types of risk viz. Insurable and Non-insurable risk.

- Insurable risks – anticipated risks
- Non-insurable risks – unanticipated risks

Insurable risks are categorised as risks which can be anticipated by the entrepreneurs. As these risks can be anticipated, it is possible to insure these risks. Some of the examples are fire, accidents, war etc. As a part of insurance, a part of the value of anticipated risk is paid as premium. This premium is considered under the cost of production. Non-insurable risks are those risks where no anticipation is possible. Here, no insurance payment is done. The non-insurable risks in businesses are due to the uncertainties in the economy. The reasons of uncertainties are listed below.

- Reasons for uncertainties - competitions in the market, business cycles,

The uncertainties affecting an entrepreneur in the economy are due to competitions in the market, business cycles, technological changes, political factors, and international factors. The competitions in the market create uncertainties in such a way that it eliminates some firms from the industry. It is not possible to always anticipate the actions of rival firms leading to uncertainty. Business cycles are a major cause of uncertainty in the economy. The variations in aggregate economic activity and resultant fluctuations in the economy need to be borne by the entrepreneur for which he is rewarded profit.

- Technological changes, political factors and international factors create uncertainty

Technological changes are mostly a result of innovations. Innovations do not happen regularly, but they create dynamic changes in the economy. The effect of innovations on businesses remains highly uncertain. Another important cause of uncertainty is changes in political and international factors. Stability in political environment of a nation is very important for businesses. Instability in political and international factors create many uncertainties which may force entrepreneurs to bear with these uncertainties.

- Profit is a mixed payment, no proportional relation with profit and uncertainty, not applicable for joint stock companies

Considering profit as just a reward for bearing uncertainty is criticised for several reasons. Profit is considered as a reward for all the functions of an entrepreneur. The functions of an entrepreneur are not only about bearing uncertainty, but managing business and organisation in all means. Also, there is no proportional relationship between uncertainty and profit, in sense that greater uncertainty does not guarantee greater profit. With respect to joint stock companies, profit is shared to shareholders where bearing uncertainty is not a determinant of profit. As a whole, considering profit as a reward for bearing uncertainty counts uncertainty as a separate factor. But, uncertainty is not a separate factor of production like the factors of production.

## Summarised Overview

Profit is the reward for entrepreneurship. An entrepreneur has many functions in the production process. There are many theories explaining profit. Profit is considered a reward for organising other factors of production. Profit is the incentive for bearing risk. Innovation is carried out by entrepreneurs. Profit is generated in the presence of uncertainties. Sometimes, profit is taken as a non-functional income. Profit arises due to dynamic changes in the economy. Different innovations and exogenous factors give rise to dynamic changes. Innovation is carried out to either reduce the cost of production or increase the demand for goods. Only non-insurable risks can create uncertainty. Non-predictable changes may bring profit.

## Assignments

1. Explain how dynamic changes in the economy considered for replacing profit.
2. Discuss the various lands of innovations in the economy and explain the innovation theory of profit.
3. Compare risk theory of profit with uncertainty theory of profit

## Suggested Reading

1. Verma K.N. (2017), *Microeconomic Theory*, Vishal Publishing Co.

## Reference

1. Dwivedi, D.N. (2012). *Microeconomics: Theory and Applications* (Second Edition). Vikas Publishing House Pvt. Ltd



## UNIT 6

# Macro Theories of Distributions

### Learning Outcomes

After completing this unit, learner will be able to:

- describe the concept of macro theories of distribution
- explain the distribution of factor share under Marxian theory
- distinguish between Kalecki's and Kaldor's theory of distribution

### Background

Distribution of income is regarded under function and personal income distributions. We have dealt with function distribution or micro theories of distribution in the previous five units. There, income distribution for individual factors of production viz. land, labour, capital, and entrepreneur is dealt. The personal income distribution is considered under macro theories of distributions. In the macro theories of distribution, distribution income from an aggregative level is analysed. The income distribution as a whole can be analysed here. The relative share of factors in national income is discussed under macro theories of Marx, Kaldor, and Kalecki.

### Keywords

Macro Theories of Distribution, Savings, Investment, Surplus Value, Labour Theory of Value, Degree of Monopoly Power

## Discussion

- Determining aggregate factor shares

### 1.6.1 Macro Theories of Distribution

The determination of price of factors viz. land, labour, capital, and enterprise represents the theory of distribution. In the previous five units, we have dealt with these theories of distribution. Then, we explained how the price of one factor is determined by one firm in the industry. This is a microeconomic study. However, we need to find how the aggregate factor price is determined, i.e., how shares of various categories of income, viz. total wage share, profit share, etc. are determined in the economy. Theories explaining aggregate factor shares in the national income represent macro theories of distribution. In this unit, we deal with macro theories of distribution.

#### 1.6.1.1 Marxian Theory of Distribution

- Stage theory

Karl Marx developed his theory into a capitalist development in his famous book, 'Das Capital' in 1867. His theory of economic development is a stage theory in which each society passes through different stages of development. For him, the first stage is primitive communism. Here, the means of production are collectively owned. The second stage is feudalism in which production control is based on land aristocracy. Under the third stage, there is capitalist means of production. For Marx, each of these stages is temporary and transitory in nature. The temporary nature is because there is a 'class war' between 'haves' and 'have nots', resulting in the collapse of each system. So, he predicted the collapse of capitalism and that the final stage of communism would prevail.

- Labour is the sole source of value

The theory of income distribution of Marx is based on the Labour Theory of Value. Marx adopted Adam Smith's and David Ricardo's labour theory of value. For Marx, labour is the only source of all value. The value of the commodity produced by the labour is equal to the labour time used to produce the particular commodity. Marx recognised the heterogeneity of labour. So, quantifying the value of products in terms of just the amount of time used to produce the commodity is difficult. So, he introduced the socially necessary labour time, which represents labour working in ordinary working conditions.

- Surplus value – difference in value of actual work and actual payment

Another concept used in the Marxian theory is the surplus value concept. Let us suppose a labourer works for 10 hours to produce particular commodities. The wage rate fixed by the employer is equal to the value of what he produces during 6 hours of his working time. The difference between the actual hours of work and the amount of wage paid is 4 hours of work. This value of 4 hours of work is the worker's right and needs to be paid to the worker. However, this is not included in his subsistence wage. The value of 4 hours of work done by the worker but not paid is the surplus value.

- $Y = C + V + S$

Under Marxian theory, the value of output includes three capitals. They are fixed capital, variable capital, and surplus value. Constant capital includes capital such as machinery, buildings, etc. which are fixed even when the output changes. Variable capital refers to circulating capital, including wage expenditure, whose stock changes with the change in output and production. The variable capital mainly includes the value of labour and generally represents wage payment. Moreover, there is surplus capital. The total national product is the sum of constant capital, variable capital, and surplus capital.

$$\text{So, } Y = C + V + S$$

There are three important ratios we can derive from the above three variables. They are given below:

- 1. Rate of Surplus Value:** It is the ratio of the surplus value to the variable capital. It is referred to as the rate of exploitation.

$$S = \frac{S}{V}$$

A change in the ratio between higher profit and lower wage payment refers to an increase in the exploitation of labour. A higher exploitation means a lower wage share and higher profit share in the national output. Marx explained that, in a capitalist country, there is always a tendency to raise the profit share in the long run and the wage rate to fall to the subsistence level.

- 2. Organic Composition of Capital:** It is the ratio of constant capital to variable capital.

$$Q = \frac{C}{V}$$

$$Q = \frac{C}{V}$$

The organic composition of capital is equivalent to the modern capital-labour ratio. It is the indicator of the degree of mechanisation. As the organic composition of capital increases, the degree of exploitation of labour increases.

**3. Rate of Profit:** It is the ratio of surplus value to total value (C+V)

$$P = \frac{S}{C+V}$$

According to Marx, as technical production becomes more and more capital-intensive, the organic composition of capital rises over time. As the organic composition of capital rises, the rate of profit,  $\frac{S}{C+V}$ , falls if the surplus value remains constant. Like the classical economists, Marx too predicted a tendency for profit to fall in the future.

- Increase in industrial army creates instability

The process of accumulation in Marx model can be explained as follows. As organic composition of capital increases, more and more workers are displaced from work. The displaced workers and the new entrants to the labour market who are unemployed form the industrial reserve army. This industrial army increases under capitalist development. With displaced workers, larger and larger outputs produced under capitalism remain not solved as the majority of people do not have a purchasing capacity. So, capitalists, in order to earn more, produce more. But, on another side, more and more workers become unemployed and hence have no earnings to purchase the production. This overproduction leads to a crisis in the economy and causes the collapse of capitalism. So, Marx believed that capitalism will be destroyed by the inherent contradictions of capitalism itself.

### Evaluation of Marxian Theory

- Emergence of welfare state under Marx's idea

Marxian theory is not justified historically. Capitalist economies have not collapsed as Marx regarded them. But, the conditions of the working class, as pointed out by Marx, seemed similar in many countries. These scenarios paved the way for workers to unite and resort to collective bargaining. This has also improved the working conditions of the working class. The modern welfare state with social welfare schemes were inspired by the ideas of Marx. It can be regarded that the social welfare schemes and measures avoided the downfall of capitalism. However, there are market failures and economic crises in capitalist countries, as Marx mentions. Marx's fall in

- Role of organic composition in falling rate of profit negated

profit proposition is examined by Joan Robinson and Kaldor. They opined that the organic composition of capital cannot be considered as the reason for the falling rate of profit. Instead, falling wages to the subsistence level and increasing organic composition increase the surplus value.

**1.6.1.2 Kalecki’s Theory of Distribution**

- Uses Lerner’s degree of monopoly

The Kaleckian theory of distribution explained the distribution of national income into wages and profit on the basis of the degree of monopoly. Kalecki used Lerner’s degree of monopoly to explain the distribution of national income. Lerner’s degree of monopoly is a microeconomic measure that Kalecki used for his macroeconomic degree of monopoly analysis by replacing marginal cost with average cost.

We know that Lerner’s degree of monopoly power is given as

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

Here, P is the price; MC is the marginal cost.

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

For Kalecki, marginal cost includes labour cost and raw material cost. The labour cost contains the cost of employing manual labour and not the wage cost of white-collar jobs. So, P – MC means the profit of entrepreneurs and aggregate overhead cost, including interest, depreciation, and salaries. So, MC includes the wages and the P – MC includes the profit share of national income.

Kalecki used two assumptions to explain the distribution of national income into wages and profit.

- MC = AC and existence of excess capacity

1. In a short period, marginal cost is equal to the average cost of manual labour and raw materials. To a point, this directs the practical capacity.
2. In reality, the output of the firm is below the maximum practical capacity. Therefore, Kalecki assumes excess capacity exists.

We know that the degree of monopoly power is

$$L = \frac{P - MC}{P} \dots\dots\dots (1)$$

When MC = AC,

$$L = \frac{P - AC}{P} \dots\dots\dots (2)$$

$$L \cdot P = P - AC$$

Since  $P - AC$  is composed of profits, interests, depreciation, and salaries, it represents the gross capitalist's income per unit of output.

The total gross capitalists' income is

$$xLP = x(P - AC) \dots\dots\dots (3)$$

where  $x$  is the total production of the firm.

$$\Sigma xLP = \Sigma x(P - AC) \dots\dots\dots (4)$$

The above equation is the gross capitalist income of all the firms in the economy.

$\Sigma xP$  will be equal to the total value of all the output produced and sold in the economy. This may be represented as the aggregate turnover of the whole economy represented as  $T$  and equal to  $\Sigma xP$

We may divide both sides of gross capitalists' income by  $T$ ,

$$\frac{\Sigma xLP}{T} = \frac{\Sigma x(P - AC)}{T} \dots\dots\dots (5)$$

•  $T = \Sigma xP$

As  $T = \Sigma xP$  equation (5) becomes

$$\frac{\Sigma xLP}{\Sigma P} = \frac{\Sigma x(P - AC)}{T} \dots\dots\dots (6)$$

$\frac{\Sigma xLP}{\Sigma xP}$  is the weighted average of the Lerner's degree of monopoly power,  $L$ . So, this expression can be written as the macro degree of monopoly power, written as  $\bar{L}$ .

$$\text{So, } \bar{L} = \frac{\Sigma x(P - AC)}{T} \dots\dots\dots (7)$$

The macro degree of monopoly power is equal to gross capital income by aggregate turnover.



- Rise in monopoly power increases profit share

An increase in the macro degree of monopoly means a rise in profit at the cost of labour share. Therefore, the distribution of output is determined by the degree of monopoly power.

### Degree of Monopoly Power and Labour share in National Income

The labour share of national income shows the degree of monopoly power, too. If A stands for real national income and W stands for wage share in the national income, A-W stands for the capitalist income or profit share in the national income. In the above equations, we see that  $\Sigma x(P-AC)$  also stands for the gross capitalist's income. Using the two representations, we can write the macro degree of monopoly power as:

$$\bar{L} = \frac{A-W}{T} \dots\dots\dots (7)$$

$$\text{So, } L^- = \frac{A-W}{T} \dots\dots\dots (8)$$

$$\bar{L} = \frac{A-W}{T}$$

Multiplying both sides by  $\frac{T}{W}$

$$\bar{L} \cdot \frac{T}{W} = \frac{A-W}{T} \cdot \frac{T}{W} \dots\dots\dots (9)$$

Cancelling out T,

$$\bar{L} \cdot \frac{T}{W} = \frac{A-W}{W} \dots\dots\dots (10)$$

Separating fractions form for RHS (right hand side)

$$\bar{L} \cdot \frac{T}{W} = \frac{A}{W} - 1 \dots\dots\dots (11)$$

$$\frac{A}{W} = 1 + \bar{L} \cdot \frac{T}{W} \dots\dots\dots (12)$$

Taking the reciprocal of the equations

$$\frac{W}{A} = \frac{1}{1 + \bar{L} \cdot \frac{T}{W}} \dots\dots\dots (13)$$

Here, the  $\frac{W}{A}$  measures the wage share of national income. The wage share is shown inversely related to the degree of monopoly power at the macro level, as indicated by  $\frac{T}{W}$ . We know that the wage share changes inversely with the degree of monopoly power. However, this inverse relation holds with



- Inverse relation between wage share and monopoly power

$\frac{T}{W}$  too.  $T$  mean price times output showing the value of all outputs. Change in the price of inputs changes the  $T$  and hence changes the  $\frac{T}{W}$ . If there is an increase in raw materials, it will change  $\frac{T}{W}$  so that it reduces wage share.

- Consistency in labour share

Kalecki explained the empirical evidence of the constancy of labour share in national income up until the Second World War. He is of the opinion that exploitation in colonial countries (raw material providers) by the capitalist countries ensured consistent labour share in capitalist countries. With cheap raw materials from the colonial countries via exploitation,  $\frac{T}{W}$  ratio in the capitalist countries are maintained and a stable wage share is maintained in the capitalist countries. For Kalecki, the labour share is consistent during business cycles, too.

- Degree of monopoly power is not the only factor determining profit

### Evaluation of Kalecki's Macro Degree of Distribution

Kalecki's theory has been criticised for many reasons.

- One of the main criticisms was pointed out by Jan Pen. He viewed that attaching profit with the degree of monopoly power ignores other factors that affect the profit. We know that marginal cost is an important factor in determining profit. The efficiency of a firm represents the level of marginal cost. It is important to consider such factors to explain the profit share of national income.
- Kalecki did not consider the role of labour unions in fixing wages and hence, the labour share of national income. Collective bargaining is an important concept when dealing with fixing wages.
- Kalecki connected industrial concentration with the degree of monopoly power.

### 1.6.1.3 Kaldor's Macro Theory of Distribution

Kaldor used the Keynesian framework to explain income distribution. The national income is divided into shares of wage and profit. For Kaldor, profit includes ordinary profit, rent, and interest, i.e., the income of those who own property. In the case of wages, it includes payment to manual labour and salaries. The following are the assumptions of Kaldor's theory.

1. He assumed a full employment state in the economy.

2. Marginal propensity to save is constant for wage earners and profit earners. Marginal Propensity to save is smaller for wage earners.

With national income being shared between wages and profit, it can be represented as

•  $Y = W + P$

$$Y = W + P \quad \dots\dots\dots (1)$$

We know that W is wage share, P is profit share, and Y is national income.

You have learnt that at equilibrium, saving is equal to investment,

$$S = I \quad \dots\dots\dots (2)$$

The total savings in society can be written as saving by wage earners and profit earners.

$$S = s_w + s_p \quad \dots\dots\dots (3)$$

Saving aggregates are  $s_w$  and  $s_p$  for wage earners and profit earners, respectively, saving can be written as

•  $S_w = s_w \times W$   
•  $S_p = s_p \times P$

$$S_w = s_w \times W \quad \dots\dots\dots (4)$$

$$S_p = s_p \times P \quad \dots\dots\dots (5)$$

$$S = s_w \times W + s_p \times P \quad \dots\dots\dots (6)$$

Then, the equation (2) can be written as

$$I = s_w \times W + s_p \times P \quad \dots\dots\dots (7)$$

Wage can be written as Y - P

$$I = s_w \times (Y - P) + s_p \times P$$

$$I = s_w \times Y - s_w \times P + s_p \times P$$

$$I = s_w \times Y + (s_p - s_w) P \quad \dots\dots\dots (8)$$

Dividing both sides by national income, Y

$$\frac{1}{Y} = s_w + (s_p - s_w) \frac{P}{Y} \quad \dots\dots\dots (9)$$

Dividing both sides by c,

$$\frac{1}{Y} \cdot \frac{1}{s_p - s_w} = s_w \frac{1}{s_p - s_w} + (s_p - s_w) \cdot \frac{1}{s_p - s_w} \cdot \frac{P}{Y}$$

$$\bullet \frac{P}{Y} = \frac{1}{Y} \cdot \frac{1}{s_p - s_w} = \frac{S_w}{S_p - S_w}$$

$$\frac{1}{Y} \cdot \frac{1}{s_p - s_w} = \frac{s_w}{s_p - s_w} + \frac{P}{Y}$$

$$\frac{P}{Y} = \frac{1}{Y} \cdot \frac{1}{s_p - s_w} = \frac{S_w}{S_p - S_w} \dots\dots\dots (10)$$

The profit share of national income is shown as a function of the ratio of investment to national income. An increase in investment rate increases the profit share and, therefore, reduces the wage share of national income. It is important to note that the kind of income distribution of Kaldor holds when the marginal propensity to save for-profit earners is greater than the marginal propensity to save for wage earners. If the marginal propensity to save is less for for-profit earners, the investment will be less. Less investment reduces production and further reduces demand and price in the economy. Continuous falls in price makes the economy unstable. So, it is essential to have a higher marginal propensity to save for profit earners to have a stable economy under Kaldor's model. The difference in marginal propensities,  $s_p - s_w$  is the coefficient of sensitivity of income distribution. With full employment and the resultant given level of income, the saving-income ratio can be raised through a distribution of income favourable to profit earners with a higher marginal propensity to save.

$$\bullet S_p > S_w$$

### Evaluation of Kaldor's Theory of Distribution

Under Kaldor's model, the distribution of income is determined under savings and investments. It is the change in the distribution of income instead of the change in the level of income which leads to a change in saving and investment.

Evaluating the theory, the shortcomings are given below:

- Kaldor has omitted the role of technical progress in the income distribution between workers and capitalists.
- Kaldor's constraint that the money wage should be greater than the socially acceptable level of subsistence is useless.

- Ignored technical progress, human capital, and unrealistic full employment

- The full employment assumption in Kaldor's model is a classical assumption but Kaldor used the framework of Keynes.
- Kaldor did not include the concept of human capital in theory.

## Summarised Overview

Factor pricing is generally known as the theory of distribution. The distribution of income may be functional distribution or personal distribution. Functional distribution refers to the distribution of income towards different factors of production for their functions in the production process, whereas personal distribution refers to the distribution of national income towards different individuals in a society. His theory of economic development is a stage theory where each society passes through different stages of development. For Marx, each of these stages is temporary and transitory in nature. The temporary nature is because there is a 'class war' between 'haves' and 'have nots', resulting in the collapse of each system. So, he predicted the collapse of capitalism and the final stage of communism would prevail.

The Kaleckian theory of distribution explained the distribution of national income into wages and profit on the basis of the degree of monopoly. Kalecki used Lerner's degree of monopoly to explain the distribution of national income. Lerner's degree of monopoly is a microeconomic level that Kalecki used for his macroeconomic degree of monopoly by using average cost replacing the marginal cost in Lerner's degree. Kaldor assumed a full employment state in the economy. Marginal propensity to save is constant for wage earners and profit earners. Marginal Propensity to save is smaller for wage earners.

## Assignments

1. Explain the Marxian theory of income distribution
2. Compare Kalecki's and Kaldor's theory of distributions

## Suggested Reading

1. Dwivedi, D.N. (2012). *Microeconomics: Theory and Applications* (Second Edition). Vikas Publishing House Pvt. Ltd

## Reference

1. Verma K.N. (2017), *Microeconomic Theory*, Vishal Publishing Co.

# MASTER OF ARTS ECONOMICS



## General Equilibrium and Welfare Economics

### Block 2



# UNIT 1

## General Equilibrium

### Learning Outcomes

After completing this unit, learner will be able to:

- gain insight into the general equilibrium
- familiarise with the Walrasian system under general equilibrium
- understand the graphical method of  $2 \times 2 \times 2$  model under general equilibrium

### Background

In microeconomics, we mostly deal with partial equilibrium analysis. Consider the Law of demand. Here, the relationship between price and the quantity demanded is stated, considering other factors affecting demand as constant. This is the *ceteris paribus* assumption. The assumption allows us to learn the effect of factors individually in an isolated manner. However, the real workings of the economy are not isolated; they are interdependent on various factors in the economy. The understanding of the working of the economy as a whole, where a general equilibrium of all markets is achieved simultaneously, is the general equilibrium analysis. Here, the interdependence in the economy happens when all the product and the factor markets are in equilibrium simultaneously, and the unknowns, i.e., the prices and quantities in these markets, are known.

### Keywords

General equilibrium, Walrasian system,  $2 \times 2 \times 2$  model, MRPT, MRS

## Discussion

### 2.1.1 Walrasian System

- Individual behaviours are represented in equations, solving which give price and demand

The most common general equilibrium model is the Walrasian model developed by French economist Leon Walras in his 'Elements of Pure Economics'. He put forward that the unknowns, the prices, and the quantities in the entire market are simultaneously determined via their interaction. A simultaneous equation having these unknowns is used by the Walras to display the interaction of sellers and buyers in all these markets. As we have discussed the use of simultaneous equations in presenting the interaction of players of the economy, the behaviour of individual players is marked via equations. Consider the case of a consumer, a consumer has a dual role; one is buying commodities, and the other one is selling the factors of production to firms. So, for each consumer, there are equations, with one showing the demand for commodities and the other showing the showing the supply of factor inputs. Similarly, each firm's behaviour will be represented in equations, one with supply or quantities of commodities produced and the other showing the demand for factor inputs. These equations are interdependent and have a simultaneous nature. The solving of these equations gives the unknowns, i.e., the price and the quantities.

- Demand and supply functions affect equilibrium

Under a Walrasian system, like many commodities and factors of production, there are many markets. There are three kinds of functions, viz. demand function, supply function, and market clearing equation under each market. It is assumed that in a commodity market, the number of demand functions and the number of consumers are equal, and the number of supply functions and the number of firms are equal. In a factor market, the number of demand functions is equal to the number of firms multiplied by the number of commodities produced, and the number of supply functions is equal to the number of consumers having ownership of factors of production.

It is important to represent the economy by means of independent equations equal to the number of unknowns. Let us assume that the economy has two consumers, A and B, two factors of production, Labour, L and Capital, K, and producing two commodities, X and Y. As there are 2 consumers, 2 factors, and 2 commodities assumed in the economy, it can be represented as a  $2 \times 2 \times 2$  model. This is the simple general

equilibrium model. Here, the assumption is that there are two commodities where each firm produces one commodity, each consumer buys some quantities of both commodities, and each consumer owns some quantity of both factors.

The number of unknowns in the simple model is as follows.

Quantities demanded of X and Y by consumers	$2 \times 2 = 4$
Quantities demanded of K and L by consumers	$2 \times 2 = 4$
Quantities demanded of K and L by firms	$2 \times 2 = 4$
Quantities of Y and X supplied by firms	2
Prices of commodities X and Y	2
Prices of factors L and K	2
The total number of unknowns is	18

The number of equations to find the unknowns are the following.

Demand function of consumers	$2 \times 2 = 4$
Supply functions of factors	$2 \times 2 = 4$
Demand functions for factors	$2 \times 2 = 4$
Supply functions of commodities	2
Clearing the market of commodities	2
Clearing the market of factors	2
The total number of equations is	18

• Equal number of unknowns and equations

In a general equilibrium condition, it may be assumed that the solution in the model exists when the number of unknowns is equal to the number of equations. However, an equal number of unknowns and equations does not guarantee the existence of a solution. While going further, it is understood that there is no independence of equations, and the number of unknowns is greater than the number of independent variables. The general equilibrium solution is difficult to attain. Walras

- General equilibrium exists under a perfect competitive structure only

was not able to prove the existence of general equilibrium. Arrow and Debreu, in 1954, proved the existence of general equilibrium in perfectly competitive conditions. The proofs are limited to certain market structures only. In reality, we mostly experience oligopoly market situations where there are indivisibilities. So, the present situation does not ensure certainty of the existence of general equilibrium considering the non-existence of perfect competition.

### 2.1.1.1 Graphical Treatment of General Equilibrium $2 \times 2 \times 2$ Model

Here, the graphical analysis of the general equilibrium under a simple economy with two factors, two commodities, and two consumers is used. The market situation under which the study confines is a perfectly competitive market structure, and the properties of the general equilibrium are based on static properties and not dynamic ones.

#### Assumptions:

1. There are two factors of production: capital K and Labour, L. They are homogenous and perfectly divisible.
2. There are two commodities, X and Y. Technology is given. The production function represents constant returns to scale, and there are no external economies or diseconomies of scale.
3. The goal of the consumer is utility satisfaction, and the firm is profit maximisation.
4. There is perfect competition in the market. Every consumer and firm faces the same set of prices, viz.  $P_x$ ,  $P_y$ ,  $w$ ,  $r$ .

- Homogenous factors, constant returns to scale, self-interest, common price

Here, general equilibrium is reached when the two commodity markets and the two factor markets, as well as two consumers and two firms, are simultaneously in equilibrium. When knowing the values of all unknowns mentioned under the walrasian system, the general equilibrium solution can be received.

#### Static Properties of General Equilibrium Model

There are three properties of a general equilibrium solution under the perfectly competitive free market situation. They are as follows:

1. Efficient allocation of factors of production among the firms – Equilibrium of production
2. Efficient distribution of commodities among the consumers – Equilibrium of consumption
3. Efficient combination of products – Simultaneous equilibrium of production and consumption

- Efficiency in the allocation of factors, resources and product-mix

These properties are called marginal conditions of Pareto Optimality. The Pareto optimality will be discussed in the later unit. The graphical representation of these optimality properties is dealt with under the  $2 \times 2 \times 2$  graphical treatment.

Let us deal with each of these properties in detail.

### 1. Equilibrium of Production / Efficiency in Factor Allocation

Equilibrium in production ensures the efficient distribution of available productive factors among the firms. The equilibrium is reached when factors are combined in such a way that the cost is minimised. At equilibrium, the slope of the isoquant shows production of the commodity using L and K and the slope of the isocost line showing the price of factors are equal,

- $MRTS_{LK} = w / r$

i.e., the  $MRTS_{LK} = w / r$

We know that  $w$  is the wage rate and  $r$  is the rent on capital.

In the  $2 \times 2 \times 2$  model, since there are two firms, the joint equilibrium of production is represented by using the Edgeworth Box of production. On the axis, the factors are measured. Each point of the Edgeworth box portrays a specific allocation of factors K and L for the production of commodities X and Y. For commodity X, the isoquant is plotted from the origin, down-left corner and for the commodity Y, the isoquant is plotted from the origin, up-right corner. The locus of points of tangency of isoquants for commodities X and Y, is called Edgeworth contract curve of production. The contract curve of production shows the efficient allocation of factors among firms. The following figure shows the Edgeworth box of production.

- Edgeworth box – each point shows the specific allocation of factors K and L for the production of commodities, X and Y

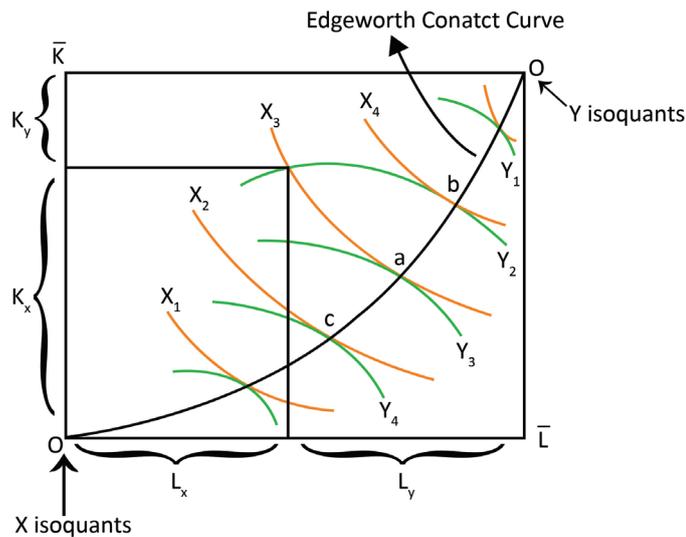


Fig 2.1.1 Edgeworth Box of Production

- Isoquant for Y – right to left downwards
- Isoquant for X – left to right upwards

In the figure, the isoquant of commodity X starts from the bottom left of the box. The isoquant is represented from left to right upwards from  $X_1, X_2, X_3, X_4$ . The isoquant of commodity Y starts from up right of the box, i.e., the isoquant is represented from right to left downwards from  $Y_1, Y_2, Y_3, Y_4$ . The factors for commodity X are represented in normal X and Y axes. The factors for commodity Y are represented on the top and right axis. Consider the case of Z point, the relevant isoquant for commodity X is  $X_3$ , and for commodity Y is  $Y_2$ . The factor combination for  $X_3$  is  $K_x L_x$ , and for  $Y_3$  is  $K_y L_y$ .

Considering the efficiency in production, not all points in the Edgeworth box represent efficient allocation of factors or efficiency in production. The allocation of factors may be considered efficient when the existing production of both the commodities is in such a manner that the increase in the production of any one of the commodities is not possible to achieve without reducing the production of the other commodity. See the points on the contract curve joined by the tangency points of isoquants of X and Y. Moving from the point 'c to a' increases the production of X but reduces the production of Y. Conversely, the movement from 'a to c' or 'b to a' increases the production of Y, but reduces the production of X. So, it is impossible to move from one point to another point along the contract curve by increasing the production of one commodity, without reducing the production of another

- Movement along the contract curve is Optimal or Efficient Production

point. However, consider point Z. A movement from Z to any point on the contract curve increases the production of one commodity without reducing the production of another commodity. If we move from Z to a, it increases the production of Y from  $Y_2$  to  $Y_3$ , with the production of X remaining the same as  $X_3$ . If the movement is from Z to b, the production of X increases from  $X_3$  to  $X_4$  with the same level of production of Y at  $Y_2$ . So, Movement from Z to contract curve is improvement, and movement along the contract curve is optimal.

Since Edgeworth contract curve of production is the locus of points of tangency of isoquants of X and Y, it is the locus of equality of slopes of the isoquants of X and Y. The efficiency in production conditions can be mathematically represented as:

$$\text{i.e., } MRPTS_{LK}^X = MRPTS_{LK}^Y$$

As we have already seen, the efficiency in production is when the slope of the isoquant is equal to the slope of the isocostline, the condition can be written as

$$MRPTS_{LK}^X = MRPTS_{LK}^Y = w/r$$

- Efficiency in Production is at  $MRPTS_{LK}^X = MRPTS_{LK}^Y = w/r$

So, the equilibrium in production occurs when the marginal rate of technical substitution of labour for capital is the same for all and the Pareto efficiency is achieved. As all the points along the contract curve is Pareto Optimal, there cannot be a single production equilibrium. A single equilibrium can be reached when the marginal rate of technical substitution of labour for capital is equal to the ratio of factor prices of labour and capital,  $w/r$ .

From the Edgeworth box, given the factor prices, it is possible to determine the quantity of commodities of X and Y produced. For equilibrium, the quantity produced must be equal to the demand of the consumers, and the Production Possibility Frontier may be used to show the equilibrium under production space. Each point on the contract curve of production can be made into production space, which shows the maximum quantity of one commodity that can be produced given the quantity of another commodity. Point a shows the maximum output produced of X, i.e.,  $X_3$ , given the production of Y as  $Y_3$ . This is represented in the production space as  $a^1$ , as shown in the figure.

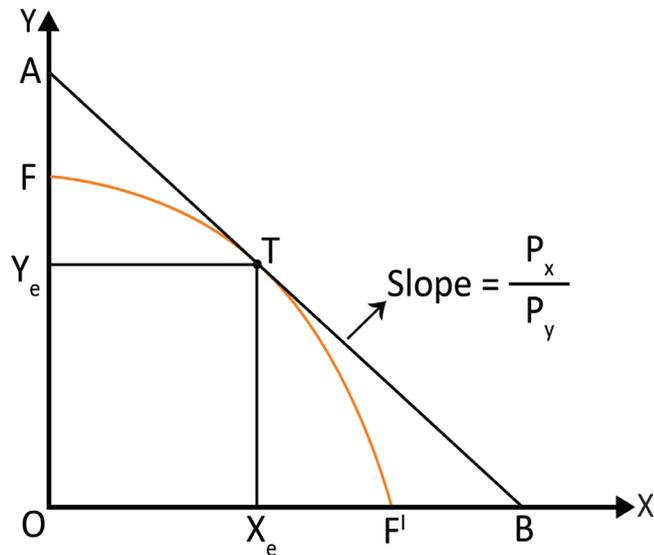


Fig 2.1.3 Equilibrium Production under Perfect Competition

- $MRPT_{XY} = P_X / P_Y$

The price of the commodity is shown by the slope of the line AB,  $P_X / P_Y$ . The equilibrium product mix is at T where  $Y_e$  and  $X_e$ .

Let us explain the second property.

## 2. Equilibrium of Consumption / Efficiency in the Distribution of Commodities

We have studied the consumer equilibrium under the theory of demand. Consumers achieve maximum utility when the marginal rate of substitution between commodities is equal to the ratio of the price of the commodities.

$$MRS_{XY} = P_X / P_Y$$

- Slope of ICs = Price ratio

Under perfect competition, the price ratio faced by consumers is same. So, the above expression can be written as

$$MRS^A_{XY} = MRS^B_{XY} = P_X / P_Y$$

For the product mix mentioned earlier,  $Y_e$  and  $X_e$ , the equilibrium consumption is shown below.

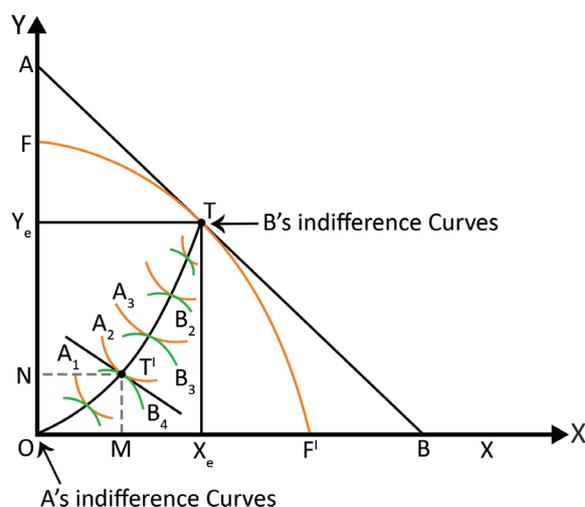


Fig 2.1.4 Equilibrium in Consumption

In the figure, an Edgeworth box of consumption is prepared, showing the exact amount of commodity  $Y_e$  and  $X_e$  derived from T. The indifference curve of consumer A starts from downward left to upward right and that of B from upward right to downward left. The locus of points of tangencies of these indifference curves shows different combinations of the two commodities where consumers are in equilibrium. The equilibrium consumption or efficiency in the distribution of commodities is shown along the locus of the tangency of indifference curves, which is known as the Edgeworth contract curve of consumption. There are a number of points along the contract curve of consumption. For equilibrium, the point at which the slope of the indifference curve equates with the price ratio of the commodity is considered. Here, the equilibrium price ratio is at T. At  $T^1$  point, the line through the tangency point of indifference curves is parallel to point T. since at T, the slope is  $P_X / P_Y$ , and at  $T^1$ , the slope is  $MRS_{XY}$ . We know that for parallel lines, the slope is equal. So,  $MRS_{XY}$  equal to  $P_X / P_Y$  condition is satisfied when ON quantity of Y and OM quantity of X is consumed by A and remaining  $N Y_e$  of Y commodity and  $M X_e$  of X commodity is consumed by B.

- Equilibrium of consumption is achieved at  $MRS_{XY}^A = MRS_{XY}^B = P_X / P_Y$

### 3. Simultaneous Equilibrium of Production and Consumption / Efficiency in Product Mix

Considering the equilibrium condition under production and distribution, the equilibrium under the third condition

of product mix requires the slope of the PPF, the marginal rate of product transformation equal to the marginal rate of substitution of two commodities between the consumers.

$$MRPT_{XY} = MRS^A_{XY} = MRS^B_{XY}$$

We have seen that  $MRPT_{XY} = P_X / P_Y$  under equilibrium in production and  $MRS^A_{XY} = MRS^B_{XY} = P_X / P_Y$  under equilibrium in consumption, leading to  $MRPT_{XY} = MRS^A_{XY} = MRS^B_{XY}$ . This is the efficiency in Product substitution. We know that the marginal rate of product transformation refers to the rate at which one commodity is transformed into another, whereas, the marginal rate of substitution refers to the willingness of consumers to substitute one good for another. When both these are equal, the production decisions will be equal to consumption decisions, and the economy will be in general equilibrium.

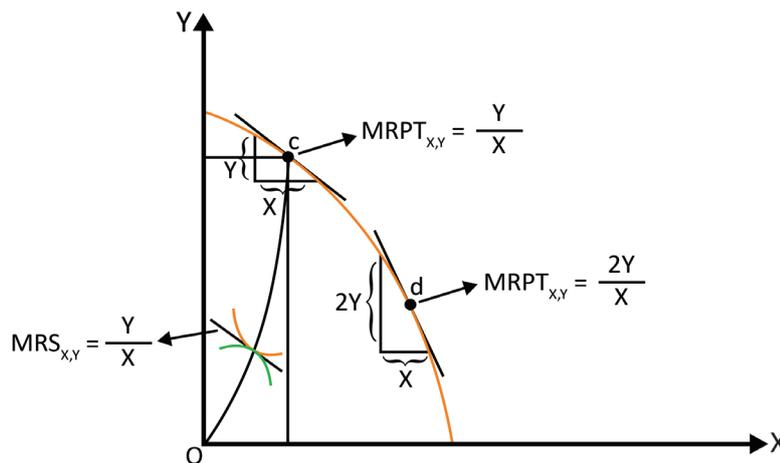


Fig 1.2.6 Disequilibrium under production and consumption

- $MRPT_{XY} = MRS^A_{XY} = MRS^B_{XY}$

With two MRPT ratios and one MRS ratio, the inequality ratio is shown in points c and d. For general equilibrium, the output combination must be equal for both producers' and consumers points.

Therefore, for an economy with two factors, two commodities, and two consumers, the general equilibrium will be achieved when all three marginal conditions are met, and this leads to Pareto efficient conditions, which will be explained later.

## Summarised Overview

The understanding of the workings of the economy as a whole, where a general equilibrium of all markets is achieved simultaneously, is the general equilibrium analysis. The most common general equilibrium model is the Walrasian model. Under a Walrasian system, like many commodities and factors of production, there are many markets. There are three kinds of functions, viz. demand function, supply function, and market clearing equation under each market. He put forward that the unknowns, the prices, and the quantities in the entire market are simultaneously determined via their interaction. The graphical analysis of the general equilibrium under a simple economy with two factors, two commodities, and two consumers assumed under perfect competition. Three properties of a general equilibrium solution under a perfectly competitive free market situation are the efficient allocation of factors of production among the firms or Equilibrium of production, efficient distribution of commodities among the consumers or Equilibrium of consumption, and efficient combination of products or simultaneous equilibrium of production and consumption. For production equilibrium, the Slope of PPF is equal to the Price ratio, which is the Marginal cost ratio. For consumption equilibrium, the marginal rate of substitution is equal to the price ratio. Under the equilibrium product mix, both the MRPT and MRS are equal.

## Assignments

1. Compare general and partial equilibrium analysis under microeconomics
2. Discuss the Walrasian system under general equilibrium
3. Elucidate the graphical treatment of the  $2 \times 2 \times 2$  model.

## Suggested Reading

1. Salvatore, D. (2003), *Microeconomics - Theory and Applications* (Fourth Edition), Oxford University Press.
2. Snyder, Christopher, Nicholson, Walter. (2012). *Microeconomic Theory: basic principles and Extension* (Ed. 11th) United State: Cengage Learning

## Reference

1. Koutsiyannis, A (2013), *Modern Microeconomics*, Macmillan Press, London



## UNIT 2

# Welfare Theories

### Learning Outcomes

After completing this unit, learner will be able to:

- be familiarised with many welfare-theories
- explain Pareto Optimality
- understand the connection between welfare maximisation and perfect competition

### Background

The evaluation of economic situations from the point of view of the welfare of the society is dealt under welfare economics. Welfare economics is also known as normative economics. Social welfare is evaluated based on some interpersonal comparisons having subjective value judgements. Under microeconomics, social welfare is examined assuming perfect competitive conditions. Understanding the welfare situation under a market situation that is viewed as not very real lacks merit. There are various welfare theories introduced at different times and sometimes as a solution to previous welfare theories. Major welfare theories you might have dealt with in your graduation are Pareto-Optimality, Kaldor-Hicks, and Bergson Samuelson. We will be having detailed discussions on this area in this unit.

### Keywords

Pareto - Optimality, Kaldor-Hicks, Bergson Samuelson, Welfare Maximisation and Perfect Competition

## Discussion

### 2.2.1 Welfare Theories

- What ought to be?
- Examines overall wellbeing of the society

Welfare economics is an important field referring to the normative side of economics. Mainly evaluated under microeconomics, welfare economics examines the overall wellbeing of a society. It considers economics and decision makings under economics from the point of view of ‘what ought to be?’ i.e., what needs to be done. There are alternative economic situations in the economy and the decision making under the alternative economic situations are evaluated so that the society’s wellbeing can be measured and understood. Each economic situation refers to a particular level and pattern of resource allocation. These resource allocations bring corresponding social welfare. Each social welfare situation are thus compared as a part of evaluating society’s welfare in order to understand the normative side of what needs to be done.

- Welfare economics make use of interpersonal comparison and value judgement

The measurement of social welfare needs interpersonal comparison and ethical standards. Both of these involve subjective value judgements. Interpersonal comparison refers to the comparison of welfare of one individual with that of the welfare of the other. Mostly, under microeconomics, welfare is measured in terms of utility. Since utility is a subjective concept, comparing individual welfare via utility to obtain social welfare is a difficult one. Value judgement is an ethical judgement or statement made in an explicit or implicit way describing good or bad, undesirable or desirable. Value judgements are also subjective.

- Evaluating social welfare

There are many welfare theories under microeconomics. The theory of welfare advocated by A C Pigou is based on cardinal measurement, whereas the Pareto – Optimality is an improvement on Pigou’s view where the ordinal criterion is used to determine the improvement or worsening of economic welfare. Kaldor-Hicks compensation criteria deals with explaining optimal conditions under Pareto criterion in a way where compensation of those worse-off is possible. Scitovsky Double Criteria is also related to same idea. Bergson Samuelson Welfare Maximisation gives importance to finding maximum social welfare. Let us explain these theories in detail.

### 2.2.1.1 A C Pigou's Version of Welfare

Pigou's analysis comes under the neo-classical version of welfare theories. He introduced a systematic version of welfare analysis. The approach was cardinal in nature where utility is expected to measure in terms of numbers. The following are the concepts under Pigou's welfare criterion.

1. **Maximisation of Utility:** According to Pigou, the welfare of the society means the maximisation of satisfaction of the whole society as the individual consumers aim to maximise individual satisfaction, sum of individual satisfactions bring maximisation of social satisfactions.
2. Interpersonal comparison of satisfaction possible.
3. Diminishing marginal utility of money so that the gain of utility from a change in income is higher for the poor than the rich.
4. Existence of perfect market condition and full employment in the economy.

- Higher national dividend generates greater availability of goods
- Distribution of income in favour of poor allocate resources for essentials and for luxury in case of rich

According to Pigou, economic welfare is based on two important factors viz. size of national dividend and distribution of income. National dividend is defined as the flow of goods and services, measured in terms of money, that is turned out during a given year in a country while keeping the capital intact. With greater size of national dividend, availability of goods and services increases leading to greater satisfaction to people and vice versa. Distribution of income is analysed under given national dividend. A distribution of income in favour of the poor ensures consumption and satisfaction in terms of essential wants and distribution in favour of the rich allows consumption of luxury goods. Fall in the allocation of resources for essential goods force poor to sacrifice certain essential goods and services.

- Unrealistic assumptions, normative value judgement is unscientific

Cardinal measure of utility and sum of individual utility to derive social utility is criticised as utility cannot be measured but can only be considered in ordinal terms. Also, unrealistic assumptions such as existence of perfect competition, full employment have been criticised by economists such as Keynes and Hicks. The normative value judgement considered under Pigovian analysis is criticised being unscientific and not empirically sound.

### 2.2.1.2 Pareto Optimality Criterion

The Pareto optimality criterion refers to measuring economic efficiency in an objective manner. The criterion is introduced by Vilfredo Pareto, an Italian economist. Let us consider the introduction of a social welfare scheme. The government's welfare policy may help in improving the welfare of one section of society. However, the same policy may not impact other sections of the society, or the scheme may negatively impact certain other sections of the society. If the policy improves the welfare of one section and does not impact the other section, the society's welfare can be referred to as an improvement. According to the criterion, Pareto referred to an improvement in social welfare as a situation where a change makes no one worse-off and at least one person better-off. Along the same line, a decrease in social welfare refers to a situation where a change makes no one better-off but at least one person worse-off. Considering Pareto's improvement and decrease in social welfare, the Pareto optimality or efficiency in social welfare is explained as a situation where it is impossible to make anyone better-off without making someone worse-off.

- Impossible to make one better-off without making other worse-off

Pareto has identified three marginal conditions to attain Pareto optimality. They are as follows:

- a. Efficiency in the distribution of commodities among consumers, i.e., Efficiency in the Exchange
- b. Efficiency in allocation of factors among firms, i.e., Efficiency in Production
- c. Efficiency in the allocation of factors among the commodities, i.e., Efficiency in Product-Mix or Efficiency in Composition of Output

- Efficiency in Exchange, Production, Product-Mix

With the assumption of  $2 \times 2 \times 2$  model, let us consider these marginal conditions in detail.

#### Efficiency in the Distribution of Commodities among Consumers

Since we follow the  $2 \times 2 \times 2$  model, the number of commodities and consumers is two each. X and Y are the two commodities, and A and B are the two consumers in the economy. Under the Pareto condition, the optimality in the distribution of

- Impossible to enhance utility via distribution without affecting another consumer

commodities among consumers can be achieved when redistribution of two commodities to enhance the utility or satisfaction of one consumer is impossible without reducing the utility or satisfaction of another consumer. The efficiency in distribution can be graphically shown using the Edgeworth contract curve. We have already seen in Unit 1 that points on the Edgeworth Contract curve are efficient. So, any other points off the contract curve are not efficient.

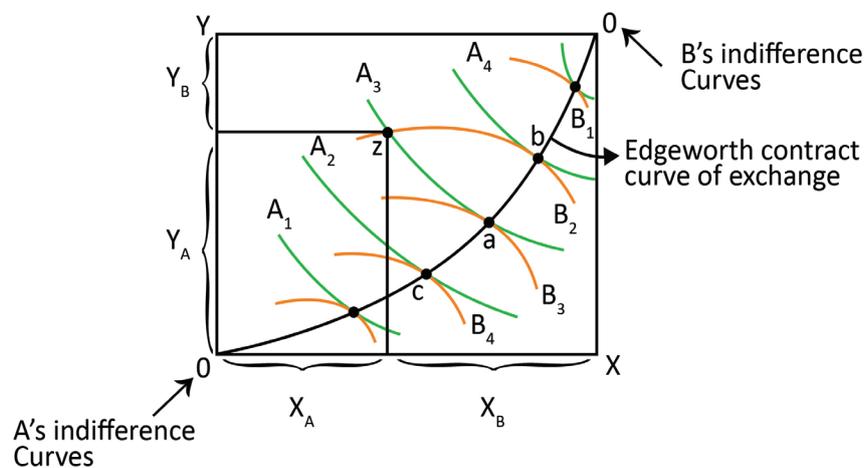


Fig 2.2.1 Edgeworth Box - Efficiency in Exchange

Indifference curves for A with commodities X and Y are  $A_1, c, A_4$ , and for B are  $B_1, B_2, B_3, B_4$ . The tangency points of corresponding indifference curves of A and B give the Edgeworth contract curve for exchange. A movement along the contract curve is Pareto Optimal. When moving from 'c' to 'a', A's utility is increased, as shown by the shift in the indifference curve from  $A_2$  to  $A_3$  and B's utility is reduced from  $B_4$  to  $B_3$ . But, a movement from point 'z', which is off the contract curve to a point on the contract curve is Pareto improvement. See the movement from 'z' to 'a'. At 'z', the relevant indifference curves are  $A_3$  and  $B_2$ . When moving to 'a', A's utility is the same with  $A_3$  indifference curve, and B's utility has increased, shown by a shift from  $B_2$  to  $B_3$ . This shows a Pareto Improvement. Therefore, a movement from points along the contract curve to points off the contract curve is Pareto inefficient. So, the contract curve represents the

- $MRS^A_{XY} = MRS^B_{XY}$

locus of Pareto optimal distribution of commodities among consumers. As the contract curve is the locus of tangency of the indifference curve and at the tangency, the slope of the curves is equal, the marginal condition for Pareto optimal distribution of commodities among consumers states that the Marginal Rate of Substitution among the commodities are equal for all the consumers.

### Efficient Allocation of Factors among Firms

- Impossible to increase profit without reducing the profit of the other

Here, the two factors used for the production of commodities X and Y are K, capital and Labour, L. Pareto optimal allocation of factors among firms refers that it is impossible to redistribute the factors to enhance the profit of one firm without reducing the profit of the other firm. The points on the contract curve show the Pareto optimality in Production.

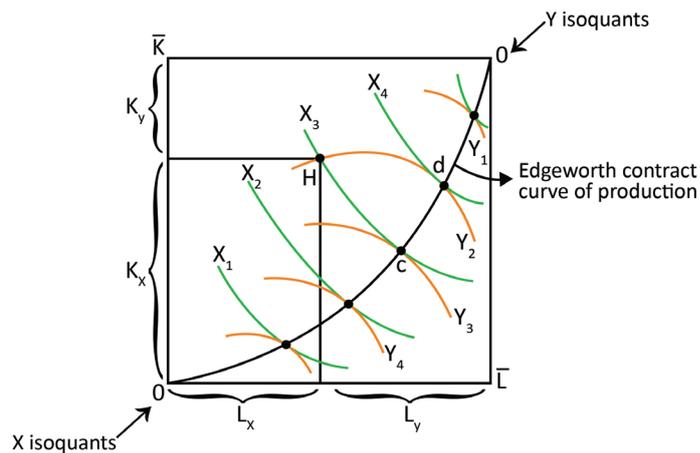


Fig 2.2.2 Edgeworth Box – Efficiency in Production

The contract curve here is the locus of points of tangency of isoquants. For commodity X, the isoquants using K and L as inputs are  $X_1, X_2, X_3,$  and  $X_4,$  and for Y, there are  $Y_1, Y_2, Y_3,$  and  $Y_4.$  Here, point 'c' to 'd' refers to Pareto Optimal points. 'H' is a point off the contract curve. A movement from 'H' to 'c' is Pareto improvement where the production of Y is enhanced with no change in the production of X. From 'H' to 'd', the Pareto improvement is via enhancing the production of X with no change in the production of Y. With, slope of isoquants being equal along the contract curve, the condition for Pareto optimal allocation of factors or inputs requires Marginal Rate of Technical Substitution for Labour for Capital being equal for both the commodities X and Y.

- $MRTS_{LK}^X = MRTS_{LK}^Y$

## Efficiency in Allocation of Factors among Commodities/ composition of output

- Efficiency in allocation of factors is at  $MRPT_{xy} = MRS^A_{xy} = MRS_{xy}$

Understanding efficiency in the allocation of factors among commodities or product mix is allowed via using the production possibility curve. We know that the marginal rate of product transformation  $MRPT_{xy}$  is the slope of PPC and it shows the rate at which a good can be converted into another. i.e., it shows the amount of commodity Y that must be sacrificed in order to produce one additional unit of commodity X. The marginal condition for efficient composition of output is that the  $MRPT$  of any two commodities under consideration must be equal to marginal rate of substitution for the same commodities. As  $MRS$  shows the rate at which the consumers are willing to exchange goods for one another and  $MRPT$  refers the rate at which a good can be transformed into another, the equality of  $MRPT$  and  $MRS$  is needed for Pareto optimality condition.

$$MRPT_{xy} = MRS^A_{xy} = MRS_{xy}$$

Therefore, the Pareto optimal condition in an economy can be achieved by following the conditions as:

- $MRS_{XY}$  among the commodities are equal for all consumers
- $MRTS_{LK}$  among the factors is the same for all the commodities under production
- $MRPT_{XY}$  is equal to the  $MRS_{XY}$  for the commodities

- Pareto Optimality is a necessary condition, not a sufficient condition for social welfare

It is important to note that Pareto optimality cannot examine a change that makes some individuals better-off and others worse off. Most of the changes in the economy that lead to social welfare are brought out by governmental policies. Government policies may be better off some and worse off others. So, the Pareto condition is a limited case in the real world. Social welfare is not always maximised when Pareto optimal situations are materialised in the economy. However, Pareto optimality is a necessary condition for the maximisation of social welfare. Therefore, Pareto optimality is not a sufficient condition for social welfare but a necessary condition.

### 2.2.1.2 Kaldor-Hicks Compensation Criterion

Nicholas Kaldor and John Hicks put forward a welfare

- Gainers can compensate losers and still remain better-off

criterion to analyse the real welfare situations in the world. They explained the compensation criterion using the following conditions. Suppose a change in the economy benefits some consumers and hurt some others. This cannot be considered as a social welfare function. However, according to Kaldor and Hicks, the situation can be made a welfare one by compensating the loser by the one who has benefitted from the change, and the benefiter still remains better off. It is possible to have an understanding of the amount of money that the benefiter is willing to compensate the loser. While asking the amount of money the gainer is ready to pay to have the change in the economy and the amount of money the loser is willing to pay to not have the change; if the amount of the gainer is greater than a loser, then, we can assume that the gainer can compensate the loss and still remain better-off. This is the base for the Kaldor-Hicks Compensation criterion, i.e., a change in the economy constitutes a social welfare situation if the gainers from the change can compensate the losers and still benefit from the change.

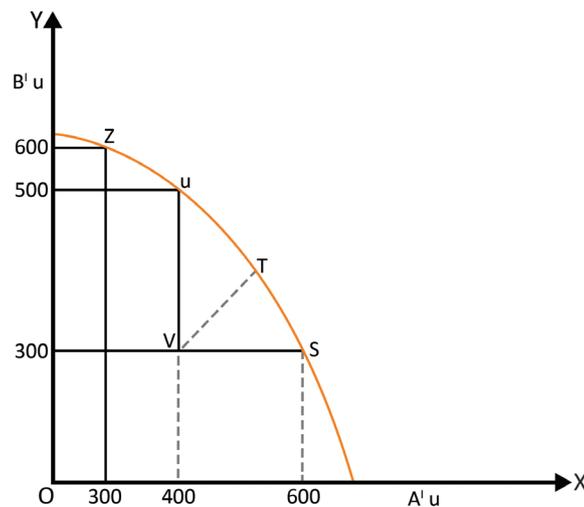


Fig 2.2.4 Kaldor-Hicks Criterion

Here, the society is at point V initially with individual A's utility measured on X axis and B's on Y axis. When a policy changes the position from V to U., there is an improvement in social welfare. If society moves to Z, A is worse off, and B is better off. But this can be made better off when B compensates A and remains better off by moving to U.

Kaldor-Hicks criterion analyses the situations based on

- Difference in MU of money is ignored

the assumption of similar marginal utility of money for all individuals. Considering the unequal distribution of income in the real world and the difference in marginal utility between rich and poor, the compensation leading to the achievement of social welfare assumed under the Kaldor-Hicks compensation criterion is not well suited to real situations. Consider the case of a person having an income of one crore per annum and a person with two lakh per annum. Suppose a welfare policy benefits the first person, and he is willing to give rupees 25,000 to have the change, and the second person is willing to spend rupees 20,000 to prevent the change. The marginal utility of the first person with one crore income per annum is less than 25,000 rupees. But, for the second person, the marginal utility of 20,000 rupees is high. Kaldor-Hicks criterion stands on the assumption of the same marginal utility of money for all individuals, which is not realistic in nature.

### 2.2.1.3 Scitovsky Double Criteria

The criterion aims to remove the Kaldor Hicks paradox. For them, a movement from original to new allocation represents an improvement, and the reverse movement can also be considered as an improvement. According to Scitovsky, the Kaldor-Hicks compensation test involves contradiction or paradox, for the removal of which he formulated his double criterion. Scitovsky double criterion consists of the fulfilment of the Kaldor-Hicks test and the non-fulfilment of the reversal test. This criterion states that the welfare of an individual due to a change in the economic situation would increase only if the gainers can compensate the losers into accepting the given change and, at the same time, the losers cannot bribe the gainers for voting against the change.

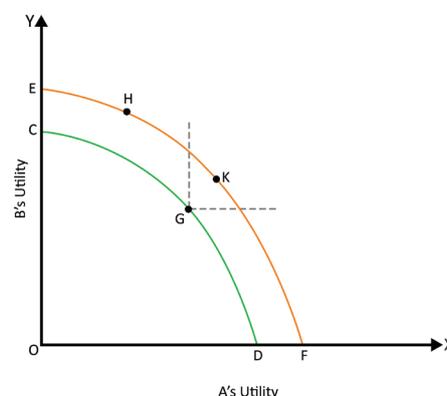


Fig 2.2.8 Scitovsky Double Criterion

- Both the movement to new allocation and reverse movement are welfare improvements

CD and EF are two utility possibility curves that are non-intersecting. Initially, two individuals, A and B, are at position G on the utility possibility curve CD. If a new economic policy is adopted, it causes a movement from position G to position H on the utility possibility curve EF. If there is a redistribution of income between the two individuals, the movement takes place from H to K. Now, position K is better than G because it ensures more utility for both A and B. So, the movement from G results in an increase in social welfare and the Kaldor-Hicks criterion is satisfied. Now, we consider what happens if there is a reverse movement from H to G. In this case, the redistribution of income cannot cause the movement from G to any other position on CD, which is better than the position G. This means the Kaldor-Hicks test is satisfied in the case of the movement from G to H, but the reverse movement from H to G is not compatible with the Kaldor-Hicks criterion. This means that the movement from position G to H satisfies Scitovsky's criterion. To sum up, it means the economic change can raise social welfare, according to the Kaldor-Hicks- Scitovsky criterion, when the two utility possibility curves are non-intersecting, and the economic change involves a movement from a position on the lower utility possibility curve to a position on the higher utility possibility curve.

#### 2.2.1.4 Bergson Samuelson Social Welfare Function

- social welfare functions show utility levels in a society

We have seen that many welfare criteria explain situations where changes in the economy make worse off some and better off some others. This makes it inevitable to evaluate welfare situations by having some value judgements about the requirements of different groups. In order to exercise value judgement in welfare analysis, Bergson put forward *social welfare functions* where value judgements are explicitly used. We can explain *social welfare function* on the basis of individual utility functions. For an individual, the utility function shows the utility derived from different amounts of commodity, whereas *social welfare functions* show different utility levels of different individuals in a society.

The *social welfare functions* of two individuals in the society are shown below.

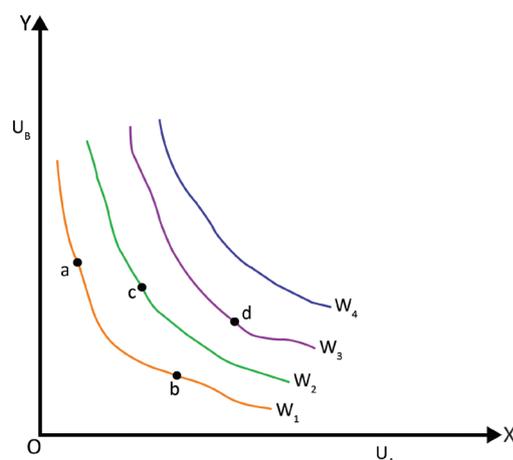


Fig 2.2.3 Bergson Social Welfare Function

- Social indifference contours for society are similar to the indifference curve for individuals

In the figure, the utility of two individuals is measured on both axes.  $W_1$ ,  $W_2$ ,  $W_3$ , and  $W_4$  measure social indifference contours. There is the locus of utilities of the two individuals, A and B, that gives the same level of social welfare. Like the indifference curves, higher and higher social indifference contours also give higher social welfare, i.e., a movement from 'b' to 'c' or 'd' shows a higher level of welfare. However, a movement from 'a' to 'b' gives the same level of welfare.

- Governments make value judgements

Constructing a social welfare function requires considering and comparing the individual's and group's worthiness evaluated by themselves. A government can make value judgements that are acceptable to society. It is not possible to derive a social indifference curve from social welfare function without taking into consideration the income distribution in the economy. There are conditions used to derive the social indifference curve from the social welfare function.

The conditions of social welfare maximisation in a  $2 \times 2 \times 2$  model are analysed under various assumptions. They are given below.

- The factors under consideration, Labour  $L$  and Capital  $K$ , are homogenous and perfectly divisible.
- These factors are distributed based on external determination.
- The commodities  $X$  and  $Y$  are produced by two firms, and a single commodity is produced by each firm. The isoquant is convex to the origin
- The preferences of consumers are represented in indifference curves

- The consumer utility is considered independent as Bandwagon, Snob and Veblen effects are taken as not applicable. Moreover, economies of consumption, both external economies and external diseconomies, are ruled out.
- The social welfare function is  $W = f(U_A, U_B)$ . There is a unique preference order.

Here, it is important to determine the welfare-maximising values of the variables such as:

•  $W = f(U_A, U_B)$   
explained using grand utility possibility frontier

1. Welfare maximising commodity - mix viz. total quantity of X and Y
2. Welfare maximising distribution of commodities produced between two consumers,  $X_A, X_B, Y_A, Y_B$
3. Welfare maximising allocation of resources viz.  $L_x, L_y, K_x, K_y$

In order to understand the maximisation of social welfare, we need to have the value of the unknowns given above. The maximisation of the social welfare function can be understood from the grand utility possibility frontier.

Let us explain the derivation of the grand utility possibility frontier.

We have already seen that the points on the Edgeworth contract curve of exchange represent that the two commodities, X and Y, can be distributed optimally among the two consumers. We can go through the following graph.

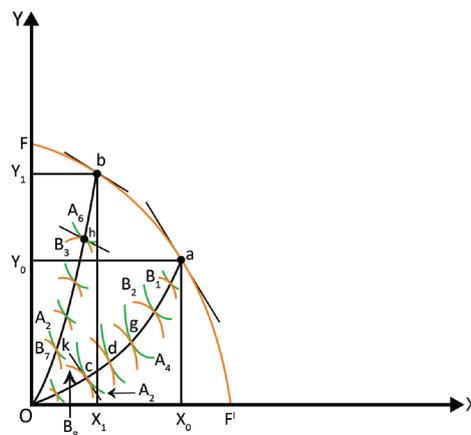


Fig 2.2.4 Edgeworth Box of Exchange

- Output space

The production possibility frontier is  $FF^1$ . Consider the point, 'a'. The combination of commodities is  $Y_0 X_0$ . The points on the contract curve,  $Oa$ , imply a different combination of commodities to two consumers showing different utilities. Point 'c' on the contract curve shows the combination of utilities for the consumer viz.  $A_2 B_8$ . The point shows that, given the distribution of commodities X and Y, the utility position of A and B individuals are  $A_2 B_8$ , and shows the maximum utility attainable by one individual given the utility of another. This point, 'c', can be represented in a utility space representing utilities in the X and Y axis from the output space shown in the above figure where output X and Y are represented in the axis. The utility space is shown below via the grand utility possibility frontier.

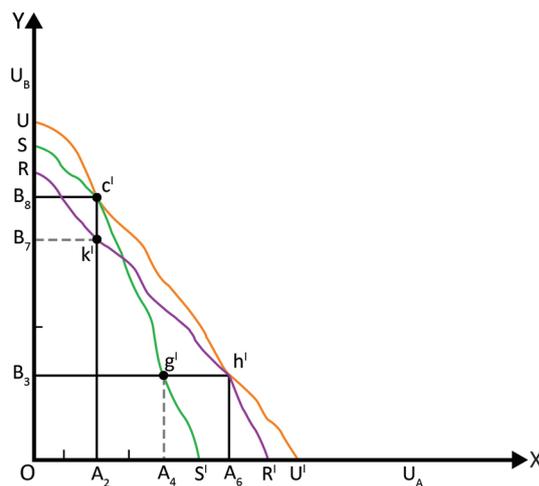


Fig 2.2.6 Grand Utility Possibility Frontier

- Utility space

The point 'c' in output space is represented in the utility space under the grand utility possibility frontier as 'c'. Similarly, other utility positions under the distribution of  $Y_0 X_0$  can be made to utility space. The point in the above Edgeworth box of exchange represents the utility position of A and B as  $A_4 B_3$ . The same point is represented in utility space as 'g'. This point shows the maximum utility attainable to B, i.e.,  $B_3$ , given the utility of A, i.e.,  $A_4$ . We can show all the points of the contract curve  $Oa$  under the commodity distribution of  $Y_0 X_0$  in the utility space shown in the figure utility possibility frontier as shown as  $SS^1$ . It shows all the maximum utility combinations attainable while distributing commodity combinations of  $Y_0 X_0$ .

- Grand utility possibility frontier is the envelope of utility possibility curves

We have seen that, like the point 'a' on the PPC showing the output combination of  $Y_0 X_0$ , many points are showing a different output or commodity combination. It is possible to create an Edgeworth box of exchange for these output combinations having respective contract curves. Take the point, 'b' having the output combination,  $Y_1 X_1$ . The Edgeworth contract curve is  $Ob$ , which shows the optimal distribution of the product mix of  $Y_1 X_1$ . Let us take a point on the contract curve  $Ob$  as 'h'. At h, the individuals maximised the utility of B with  $B_3$ , given the utility of A and  $A_6$ . The utility position shown by 'h' can be represented as 'h<sup>1</sup>'. The point 'k' in the PPF can also be represented in the utility space as 'K<sup>1</sup>'. As representing all the points on  $Oa$  contract curve on utility space, the points on  $Ob$  can also be represented on the utility possibility. Joining all the points on  $Ob$  contract curve represented under utility space derives utility possibility frontier  $RR^1$ . Therefore, each point on contract curves joining PPC creates a utility possibility frontier. The Grand utility possibility frontier is the envelope of all the utility possibility curves.  $U U^1$  is the grand utility possibility frontier. Points on the grand utility possibility frontier have all the marginal conditions under Pareto Optimality satisfied.

We can join the social welfare function with the grand utility possibility frontier to determine the welfare-maximising point. Social welfare is maximised when the grand utility possibility frontier is tangent with the highest possible social indifference curve. The point of tangency is represented as the point of Bliss. It is denoted as the  $W^*$ .

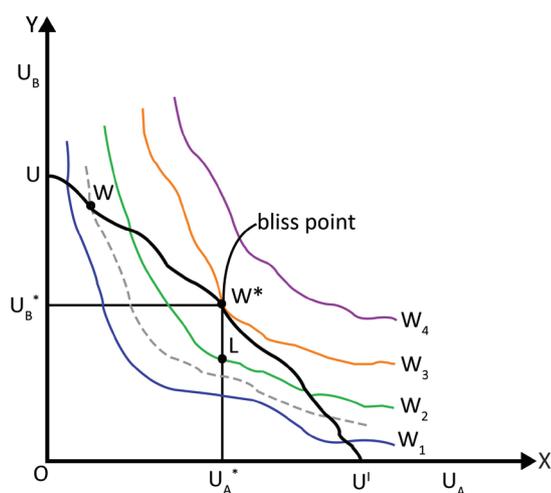


Fig 2.2.7 Maximum Social Welfare

- Point of Bliss - grand utility possibility frontier tangent with the highest social indifference curve

In the figure, the maximum social indifference curve is represented by  $W_3$ . The welfare point or point of bliss is  $W^*$ , and the utility positions of individual A is  $U_A^*$  and B is  $U_B^*$  respectively. For welfare maximisation, the Pareto optimality is a necessary condition. i.e., welfare maximisation happens on the grand utility possibility frontier, and all points on the grand utility possibility frontier satisfy all the marginal conditions of Pareto Optimality. However, the Pareto Optimality is not a sufficient condition for welfare maximisation. There are many points below the grand utility possibility frontier which have a higher level of social welfare than on the utility frontier but not Pareto Optimal. The point L is on a higher indifference curve than the point N. The welfare position of L is greater than that of N. However, N is on the grand utility possibility frontier, which makes it Pareto Optimal.

### 2.2.1.5 Welfare Maximization and Perfect Competition

In the determination of maximum social welfare and point of bliss, the tangency of points of social indifference curve and grand utility possibility frontier is considered, and not price. We have discussed that perfect competition causes general equilibrium when the three marginal conditions of Pareto Optimality is satisfied. This may be extended to a point of bliss in maximising social welfare.

- Profit maximisation at  $MRTS_{LK}^X = MRTS_{LK}^Y = w/r$

**1. Profit Maximisation:** Profit maximisation refers to maximum output production at minimum cost. Cost minimisation is attainable when the input combination at which the marginal rate of technical substitution of the two factors is equal to the ratio of input price.

$$MRTS_{LK} = w/r$$

When all firms experience the same set of factor prices under perfect competition,

$$MRTS_{LK}^X = MRTS_{LK}^Y = w/r$$

**2. Utility Maximisation:** For utility maximisation, the marginal rate of substitution of commodities must be equal to the ratio of the prices of the commodities,

$$MRS_{XY} = P_X / P_Y$$

- $MRS^A_{XY} = MRS^B_{XY} = P_X / P_Y$

When all consumers have the same commodity price under perfect competition,

$$MRS^A_{XY} = MRS^B_{XY} = P_X / P_Y$$

**3. Welfare Maximisation:** We have seen that social welfare is maximised when the highest possible social indifference curve is tangential to the grand utility possibility frontier derived from the PPF,

- $MRPT_{XY} = P_X / P_Y = MC_X / MC_Y$

$$MRPT_{XY} = P_X / P_Y$$

Considering profit maximisation under a perfect competitive market for a firm with all the factors taken, we can represent it as,

$$MRPT_{XY} = P_X / P_Y = MC_X / MC_Y$$

- Price plays an implicit role in social welfare maximisation under perfect competition

The above condition establishes the maximum social welfare under a perfectly competitive market situation. This shows the maximising situation of both consumer and firm. Here, it is shown that when individuals act on self-interest, an invisible hand works under a perfectly competitive free market system where the general welfare of all is achieved. Though welfare maximisation is achieved via the maximisation of self-interest of individuals, implicitly, prices play a role when an individual considers the price in the maximisation of self-interests, and thus, social welfare is achieved.

### 2.2.1.6 Arrow and Debreu Social Welfare function

- Zero excess demand and zero profit

The Arrow-Debreu model is formalised under the general equilibrium model. The model states that there are finite numbers of consumers, commodities, and production units in a competitive economy. Here, consumers act on a set of well-defined preferences. The characteristics of the preference is align with that continuous convex preference shown under indifference curve approach. Each consumer holds an initial endowment of the commodities. The technology ensures constant returns to scale. The economy works in such a way that every producer maximises profit and every consumer maximizes utility over their budget sets. The equilibrium of the economy is characterised by equality of demand and supply with a set of prices having no excess demand from consumers and no profit for producers.

- General equilibrium structure

Arrow-Debreu model can be easily modified with proper definition of the commodities based on the commodity's location or time of delivery. The conditions existing in the various states of the world can be considered. When commodities are specified to be conditional on various states of the world, the Arrow-Debreu model can easily incorporate expectation and uncertainty into the analysis. Theoretical extensions and applications have been made to analyze financial and monetary markets and international trade, as well as other subjects. With a general equilibrium structure, the model is applicable in assessing the overall impact on resource allocation of policy changes in areas such as taxation, tariff, and price control.

### 2.2.1.7 Theory of second best

The theory of the second best refers to a situation under welfare economics when one or more optimality conditions cannot be satisfied. The theory explains that if one optimality condition in an economic model cannot be satisfied, it is possible that the next-best solution involves changing other variables away from the values that would otherwise be optimal. So, changing the other variables (which other-wise was optimal) for correcting the one sub- optimality condition, creates issues. The theory implies that when acting on correcting some imperfections, there will be a fall in overall economic inefficiency instead of increasing it.

- Opting next best

When one optimality condition in an economic model cannot be satisfied, then opting for the next best solution involves changing other variables away from the values that would otherwise be optimal. In an economy with some uncorrectable market failure in one sector, government intervention to correct market failures in another related sector with the intent of increasing overall economic efficiency may actually decrease overall economic efficiency. So, practically, it is always better to let two market imperfections cancel each other out rather than make an effort to fix either one. Thus, it may be optimal for the government to intervene in the second market in a way that does not affect the first market. Therefore, the theory advises that there is a need to study the details of the situation before jumping to a theory-based conclusion because an improvement in market perfection in one area may not necessarily imply a global improvement in efficiency.

## Summarised Overview

There are many welfare theories under microeconomics. The theory of welfare advocated by A C Pigou is based on cardinal measurement, whereas the Pareto – Optimality is an improvement on Pigou’s view where ordinal criterion is used to determine the improvement or worsening of economic welfare. Kaldor-Hicks compensation criteria deals with explaining optimal conditions under the Pareto criterion in a way where compensation of those worse-off is possible. Scitovsky Double Criteria is also related to the same idea. Bergson Samuelson Welfare Maximization gives importance to finding maximum social welfare. Let us explain these theories in detail. Pigou’s analysis comes under the neo-classical version of welfare theories. He introduced a systematic version of welfare analysis. The approach was cardinal in nature. According to the criterion, Pareto referred to an improvement in social welfare as a situation where a change makes no one worse off and at least one person better-off. Along the same line, a decrease in social welfare refers to a situation where a change makes no one better-off, but at least one person worse-off. Considering the Pareto’s improvement and decrease in social welfare, the Pareto optimality or efficiency in social welfare is explained as a situation where it is impossible to make anyone better-off without making someone worse-off. Bergson put forward social welfare functions where value judgements are explicitly used. Perfect competition causes general equilibrium when the three marginal conditions of Pareto Optimality are satisfied.

## Assignments

1. Explain Pareto Optimality and compare it with Pigou’s welfare criterion
2. Compare and discuss Kaldor – Hicks and Sitovisky’s criterion
3. Explain how the point of bliss is determined under the Bergson-Samuelson criterion

## Suggested Reading

1. Salvatore, D. (2003), *Microeconomics -Theory and Applications* (Fourth Edition), Oxford University Press.
2. Snyder, Christopher, Nicholson, Walter. (2012). *Microeconomic Theory: basic principles and Extension* (Ed. 11th) United State: Cengage Learning

## Reference

1. Koutsiyannis, A (2013), *Modern Microeconomics*, Macmillan Press, London



## UNIT 3

# Welfare Theories II

### Learning Outcomes

After completing this unit, learner will be able to:

- understand Arrow's impossibility theorem
- familiarise with the capability approach
- know about equity efficiency trade off

### Background

Making social choices based on individual preferences is evaluated in Arrow's Impossibility Theorem, whereas how individual abilities are transformed is dealt with under the capability approach. We have seen in theories discussed in earlier units discussing the optimisation of social welfare. Measuring utility to find out welfare and doing inter-personal comparisons is generally done in those theories. In Arrow's theory, decision-making for social choice is done and is explained not as a purely social welfare function. Making social choices by considering the preferences of all individuals together is taken for getting Bergson's social welfare function. However, Arrow examined whether individual preferences with many alternatives bring social choice that maximises the social welfare. Let us examine the theories in detail.

### Keywords

Majority rule, transitivity, non-dictatorship, irrelevant alternatives, Capability Theory, equity, efficiency

## Discussion

- Social welfare function for all is impossible to construct

### 2.3.1 Arrow's Impossibility Theorem

The welfare theorems explained in the previous unit were mostly based on explicit value judgements. The Bergson-Samuelson social welfare function was an improvement on these theories. The theory proposed the achievement of maximum social welfare via a movement from individual preferences to social preferences. This proposition of Bergson-Samuelson social welfare function was criticised by Kenneth Arrow in the book, *Social Choice and Individual Values*. As per Arrow, the movement from individual preferences to social preferences and the construction of social welfare function is not possible. For Arrow, it is impossible to construct a social welfare function that fits all.

- Social choice via traditions, dictators, democratic procedures

According to Arrow, making social choices can be done in the name of traditions or customs, by a dictator, or via the democratic procedure. Doing this is easy if dealt with under traditions or customs or by a dictator. But, making choices through these two methods suffers from bias. The value judgement under the social choices made here may not reflect the true choices of the society. In the case of making social choices via democratic procedures, individual ordering through the democratic procedure of free voting also has difficulties. Arrow opined that it is not possible for an individual to analyse the welfare of public or collective things via own consumption, but via consumption of others too, by the individual ordering of alternative social states.

For Arrow, a social welfare function can be constructed where social choices are reflected by individual ordering, possible with the following necessary conditions:

- Transitivity or Consistency:** Transitivity exists when alternatives A, B, and C are preferred in such a way that A is preferred to B, B is preferred to C, then A should be preferred to C. Any reverse preference breaks transitivity.
- Non-imposition:** The condition rejects the existence of a dictatorship. It states that social choice must not be imposed by one individual on another. This allows the working of democratic procedures.
- Responsiveness to individual preferences:** This shows that the social choices must be responsive to individual

- Transitivity, absence of dictatorship, alignment of social choice with individual choice, not to depend on irrelevant alternatives

preferences, i.e., the social choices must move in the same direction as individual choices.

**d. Independence of irrelevant alternatives:** This condition explains that if there are two alternatives to be ranked for social choices, then no other alternatives should have any effect on social ranking. For example, if a social choice needs to be taken among the alternatives of a cricket stadium or football stadium, then a third alternative, a library, should not be a factor to depend on while making a choice.

- Impossible to make social choices based on individual preferences without violating any of the conditions of making social choices

These conditions are reasonable, but it is impossible to make social choices without violating any one of them. Arrow explained that with two alternatives, individuals can make social choices via majority rule or free voting procedure. But, when there are more than two alternatives, the majority may fail to provide social choice without violating any of the above conditions. Making social welfare functions on the basis of individual preferences via voting is impossible when there are more than two alternatives. Therefore, the essence of Arrow's impossibility theorem is that it is impossible to determine social choices from individual choices for making social welfare functions.

The following table explains this.

**Table 2.3.1 Individual Ranking of Alternative Social Choices**

Individuals	Alternative Social Choices		
	X	Y	Z
A	3	2	1
B	1	3	2
C	2	1	3

- Impossible to make social choices on individual preferences with more than two alternatives

There are three individuals viz. A, B, and C. The three alternatives available are X, Y, and Z. The most preferred alternative got the number 3, second place got 2, and the least preferred was 1. Here, A prefers X over Y, Y over Z, and therefore, X over Z. B prefers Y over Z, Z over X. Therefore, Y over X. C prefers Z over X, X over Y, and therefore, Z over Y. So, A and C prefer X over Y, A and B prefer Y over Z, and B and C prefer Z over X. Here, it is impossible to get a social choice via individual preferences done through majority rule. So, Arrow opined that it is impossible to make social

choices based on individual preferences shown through a simple majority.

### 2.3.2 Sen's Capability Theory

- Individuals have different capacities to transform goods and services into valuable achievements

Amartya Sen considered it misleading to measure well-being in terms of measurement of utility and resources. For him, well-being must be understood in terms of people's freedom and the choices that they make. Sen's Capability Approach proposed that people have different capacities to translate goods and services into valuable achievements because of personal, social and locational arrangements in their lives. Sen's capability approach highlighted some issues in the conventional evaluation approach for the development framework. They are Individuals can have different abilities to change similar resources into valuable functioning. Evaluation focussing on means without acknowledging what different people can do with them will be misleading. Individuals can internalise the deprivation in order to stop desiring what they can never achieve. Individuals may or may not take up the option that they possess, while they have valuable options. Every individual's reality is complex and multi-dimensional; hence, every evaluation should acknowledge this complexity and consider its multidimensional aspect into its parameters.

- Quality of life – Functioning and capability

The capability approach tries to address all these concerns and hence lends us a multidimensional lens through which to look at the concept of human well-being. It is not a theory to understand poverty or human well-being; rather it is an evaluation tool to conceptualise and then analyse such social derangements. According to Sen, it is very important to understand what people are actually able to be and do. This approach focuses directly on the quality of life that an individual can achieve. This quality of life is defined in terms of 'functioning' and 'capability'. - Functionings are states of 'being and doing', "it is an achievement of a person: what he or she manages to do or be, and any such functioning reflects, as it were, a part of the state of that person" - Capabilities denotes the set of valuable functions that an individual has effective access to. Hence, the evaluation of well-being must be measured within the boundaries of capabilities and not just functionings, it should consider opportunities and not achievements.

### 2.3.3 Equity - Efficiency Trade Off

- Equitable distribution of income and optimum welfare

The prime concern of welfare economics has remained with the achievement of economic efficiency. The earlier neo-classical approach to welfare emphasised the dual criterion of an increase in the gross national product and a more equitable distribution of income and product for the maximisation of social welfare. The Paretian approach was directed to achieve the Paretian welfare optimum or Paretian efficient solution, assuming a given distribution of income, which is implicitly supposed to conform to equity or justice. In other words, Paretian welfare analysis recognised no conflict or contradiction between efficiency and equity. It skirted the question of sacrificing equality for the sake of efficiency or of sacrificing efficiency for the sake of realising the equitable or just distribution of income between the rich and poor. In other words, Pareto did not attempt to deal with any trade off or exchange between efficiency and equity. The Pareto-efficient or Pareto-optimal situation, determined by the efficiency in exchange, efficiency in production and efficiency in the product mix and overlooking altogether the need to improve the income distribution, came in for severe criticism by Amartya Sen.

- Compensation Criteria too avoided the trade-off of efficiency and equity

Even in the compensation principle advocated by the writers like Kaldor, Hicks and Scitovsky, the basic concern was with the achievement of maximum social welfare. The compensation paid by the gainers or received by the losers is essentially meant to achieve the maximum social welfare. It is never analysed whether or not the economic change will make the income distribution equitable. In this connection, Arrow commented that the increase in output or wealth could have little meaning independent of distribution. Even the compensation principle avoided the issue of the possibility of a trade off between efficiency and equity.

## Summarised Overview

For Arrow, it is impossible to construct a social welfare function that fits all. According to Arrow, making social choices can be done in the name of traditions or customs, by a dictator, or via the democratic procedure. Doing this is easy if dealt with under traditions or customs or by a dictator. In the case of making social choices via democratic procedures, individual ordering through the democratic procedure of free voting also has difficulties. A social welfare function can be constructed where social choices are reflected by individual ordering is possible with the following necessary conditions, viz. transitivity, absence of dictatorship, alignment of social choice with individual choice, and not depending on irrelevant alternatives. With more than two alternatives, Arrow opined that it is not possible to make a social choice without violating any one of the conditions. Sen's Capability Approach recognises the fact that, people have different capacities to translate goods and services into valuable achievements because of personal, social and locational arrangements in their lives. Theories of welfare economics work in a space where the question of equity versus efficiency is always present.

## Assignments

1. Examine Arrow's impossibility theorem and explain how democratic procedures are difficult in making social choices via individual preferences.
2. Explain Capability Approach
3. Discuss Equity–efficiency trade-off.

## Suggested Reading

1. Salvatore, D. (2003), *Microeconomics -Theory and Applications* (Fourth Edition), Oxford University Press.
2. Snyder, Christopher, Nicholson, Walter. (2012). *Microeconomic Theory: basic principles and Extension* (Ed. 11th) United State: Cengage Learning

## Reference

1. Verma K.N. (2017), *Microeconomic Theory*, Vishal Publishing Co.

# MASTER OF ARTS ECONOMICS



## Externalities and Public Goods

### Block 3



# UNIT 1

## Positive and Negative Externalities

### Learning Outcomes

After completing this unit, learner will be able to:

- know positive externalities and negative externalities
- explain how externalities arise in both production and consumption
- analyse the impact of negative externalities on market efficiency and welfare

### Background

Suppose, you decide to renovate your room. It will be a beautiful upgrade for you, but consider the impact on your neighbours. The construction will likely generate noise and dust throughout the day, disrupting their work or relaxation time. Additionally, if parking is limited on your street, the entry of workers and materials could make it difficult for others to find a spot. In this scenario, the renovation project creates negative externalities for your neighbours. The noise and dust are costs they experience but have no say in, while the parking issue restricts their access to a public good i.e., street parking. These externalities are not reflected in the price of your renovation, potentially leading to an inefficient allocation of resources. This is a simple example of an externality.

Externalities occur when the production or consumption of a good or service affects a third party who is not directly involved in the transaction. These effects can be positive or negative. Understanding externalities is crucial because they can lead to market inefficiencies. The price of a good or service typically reflects the costs and benefits borne by the producer and consumer directly involved in the transaction. However, externalities represent additional costs or benefits that are not factored into the market price. This can lead to either overproduction or underproduction of certain goods and services, depending on whether the externality is negative or positive.

In this unit, we will examine both negative and positive externalities, how they arise in production and consumption activities, and the challenges they pose to achieving an efficient market.

## Keywords

Externalities, Negative Externality, Positive Externality, Marginal Social Cost, Marginal Social Benefit

## Discussion

### 3.1.1 Externalities

Externality occurs when someone's actions affect other people or things without getting them paid or compensated. Externalities can be positive or negative. Let us consider the textile industry. In the production of textiles, particularly in dyeing and finishing processes, various chemicals are used. One common by product of these processes is wastewater containing pollutants such as heavy metals, organic compounds, and dyes. When this wastewater is released into water bodies without proper treatment, it can contaminate the water, harm aquatic life, and potentially affect human health if the contaminated water is used for drinking or irrigation. Thus, if a textile industry pollutes a river, that is a negative externality because it harms the environment and people who use the river water. On the other hand, if a person plants flowers in their yard and it makes the neighbourhood look nicer, that is a positive externality because it benefits others without them having to pay for it.

- Externalities are unpriced effects of actions on others

Thus, externalities happen when someone's actions affect others without any compensation involved. If it is a bad impact, like pollution, it is called a negative externality. If it is a good impact, like a beautiful view, it is a positive externality. In these situations, society's interests go beyond just the buyers and sellers in a market. Society cares about everyone being affected, not just the buyer and seller. In a perfect market, buyers and sellers only consider their costs and benefits when making decisions like how much to buy or sell. This usually leads to an equilibrium point where supply and demand meet.

- Market ignores social impacts

But externalities complicate things. When an activity creates costs or benefits for people outside the market, those costs/benefits are not reflected in the price. This means the market equilibrium does not represent the most efficient outcome for society as a whole. Efficiency, in this case, means getting

- Externalities distort market efficiency

the most overall benefit for everyone involved. Externalities distort this situation because buyers and sellers only consider their own benefit, not the impact on others. This can lead to overproduction (negative externalities) or underproduction (positive externalities) compared to the ideal social optimum. As we discussed in the background, the production of noise from a construction site is a negative externality. Construction companies may not fully account for the disturbance they cause to nearby residents and might make excessive noise unless regulations or penalties are imposed by the government to reduce such disruptions.

- Governments address externalities through regulations and incentives

Externalities come in various forms, and governments often intervene to address market failures. For instance, when a company emits harmful chemicals into a river, it is a negative externality because it affects people downstream who rely on clean water. To fix this, governments might impose regulations on pollution levels or create incentives for companies to adopt cleaner practices. On the positive side, think about a company that invests in employee training. This creates a skilled workforce that benefits not just the company but also the broader community by improving employment opportunities and boosting local economies. However, since the company does not fully capture all these benefits, governments might provide tax incentives or grants to encourage more investment in training programmes. Similarly, the use of renewable energy sources like solar power can generate positive externalities by reducing pollution and greenhouse gas emissions. Governments can promote this by offering subsidies or tax credits to individuals and businesses adopting renewable energy technologies. In each case, the key idea is that actions by individuals or businesses can impact others positively or negatively, and governments step in to ensure that these effects are considered for the overall benefit of society.

### 3.1.2 Externalities in Production

Externalities in production happen when making goods or services impacts people or things outside the production process. These impacts, positive or negative, arise when production creates costs or benefits that are not considered in the price of the product. For instance, a factory might release noise or chemicals during production. These are negative externalities because they harm people nearby who had nothing to do with making the product. The cost of this harm is not

- True cost is not reflected in product prices

included in the price of the product. On the other hand, a farm might create a beautiful view while growing crops. This is a positive externality. People who enjoy the view are not paying for it directly. The problem with externalities is that they can make markets less efficient. The true cost of production is not reflected in the price. This can lead to companies producing too much of something harmful or not enough of something beneficial. Let us discuss this disparity.

### 3.1.2.1 Divergence Between Private and Social Costs

Let us think of a scenario where a candy store sells lots of tasty lollipops. In a perfectly competitive market, the candy store's costs like buying sugar and sticks match the price they sell the lollipops for. The candy company produces until their marginal cost (MC), which is their production cost, equals the price ( $P_x$ ) they can sell the candy for.

$$MC_x = P_x$$

Here,  $MC_x$  means the marginal cost of the product lollipop and  $P_x$  refers to the price of the product (lollipop). This keeps things efficient for the company, but there is a catch. This private cost (MC) does not include the negative externalities caused by candy production, such as the mess from the candy wrappers littering the streets or the dentist bills for cavities caused by eating too many lollipops. These extra costs are what we call external costs. Because the candy company does not pay for them directly.

- Private costs exclude externalities

Now, suppose the City Health Department calculates these extra costs and adds them up to the private cost (MC) to get the marginal social cost (MSC). In other words;

- Adding external costs to private costs gives marginal social cost (MSC)

$$MSC = MC (\text{private cost}) + MEC (\text{marginal external cost})$$

This shows the divergence between the private cost a company sees and the true cost to society.

This MSC reflects the true cost of candy production to society, which shows the divergence between private costs and social costs.

Since Candy company only considers its own MC, it might produce more candy than is socially optimal. Because, the market price ( $P_x$ ) is set based on the private cost (MC). But the true cost to society is higher ( $P_x < MSC$ ). Without paying the full cost, Candy company might produce more candy than would be ideal for society as a whole.

If candy company were forced to pay the full social cost (MSC), they would produce a smaller, more socially optimal amount of candy. This production level would occur where,

$P_x = MSC_x$  i.e., the price ( $P_x$ ) equals the marginal social cost (MSC).

- Ignoring the social cost, candy company overproduces

Also, the candy company may offer healthier candy options with lower sugar content, promote littering control through sustainable packaging or marketing strategies, partner with schools or healthcare providers on educational campaigns about healthy snacking. These actions could lead to a more socially optimal level of candy production.

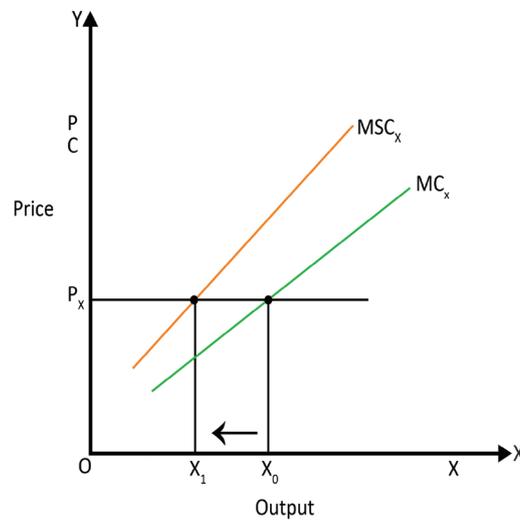


Fig: 3.1.1 Divergence between Private and Social Cost

In the above figure, X-axis shows output and Y axis shows price.  $MC_x$  refers to Private cost and  $MSC_x$  refers to marginal social cost. When the social cost of producing candy is higher than the private cost, we see that the marginal social cost ( $MSC_x$ ) curve lies above the private marginal cost curve ( $MC_x$ ). This difference between the two curves represents marginal

- Government intervention optimises production efficiency

external costs incurred in the production and consumption of candy. If the company does not have to pay these extra costs, it will produce more to maximise output at the point  $X_0$  on the graph. But if the government steps in and makes the company cover these external costs, the company will reduce its output to a level like  $X_1$ .

### 3.1.2.2 Divergence Between Price and Social Benefit

- Price may not reflect social benefit

Even if the price matches the marginal social cost (MSC), it does not ensure maximum social welfare because the price may be different than the social benefit. Assume, someone getting vaccinated against the flu. They pay the price ( $P_g$ ) to protect themselves, but this vaccination also protects others around them by reducing the spread of the illness. This creates a positive externality. The price of the vaccine ( $P_g$ ) would not reflect the marginal social benefit (MSB) of a healthier community. Since  $P_g$  is likely lower than MSB, companies might produce fewer vaccines than what is socially optimal. If the government somehow factored the ‘herd immunity’ benefit into the price by making it equal to MSB, people would pay the true cost, and vaccine companies would likely increase production to a level that balances individual health needs with community well-being. This can be shown with the help of a figure.

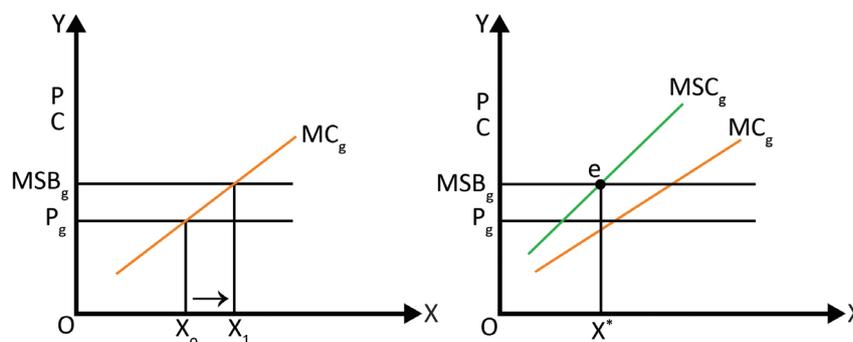


Fig: 3.1.2 Divergence Between Price and Social Benefit

In the above figure, when looking at the Marginal Social Benefit ( $MSB_g$ ) curve and the Price the consumer pays ( $P_g$ ) curve, we see that the  $MSB_g$  curve is always above the  $P_g$  curve across all levels of production. If consumers were to pay the full MSB, the company would increase its output from  $X_0$  to  $X_1$ . However, when considering any external costs, the Marginal Cost (MC) curve would shift to the left. This leads to a new equilibrium at point e, where the Marginal Social Cost

- MSC matching MSB ensures socially optimal production

( $MSC_g$ ) equals the Marginal Social Benefit ( $MSB_g$ ). In simple terms, when there are externalities, the key to reaching socially optimal production is ensuring that the Marginal Social Cost (MSC) matches the Marginal Social Benefit (MSB).

### 3.1.2.3 Positive Externalities in Production

Externalities play a significant role in the real world, affecting the attainment of maximum social welfare. Several examples represent the extent of this problem. Let us see some real-life examples.

- Government intervention ensures the provision of essential infrastructure

**i. Development of a New Port Facility:** Developing a government funded port facility enhances trade and economic efficiency by reducing transportation costs for individual firms. Although this lowers the private marginal cost (PMC) of individual firms, the overall social cost, known as the marginal social cost (MSC), remains higher due to broader costs associated with the facility. This difference between private and social costs indicates a market failure known as an externality, where the actions of one party (the firms benefiting from the port) impose costs or benefits on others (the broader society) without compensation. In this case, the private benefits captured by individual firms do not fully account for the social benefits like increased trade volumes, job creation, and economic growth. Consequently, government intervention is necessary to bridge this gap and ensure the provision of essential infrastructure. By subsidising or directly funding the port, the government can incentivise private actions to better reflect broader societal goals, ensuring that the benefits of the port are more equitably distributed across society. This intervention promotes overall welfare and economic efficiency.

- More solar panels mean cheaper silicon due to economies of scale

**ii. Expansion of the Solar Panel Industry:** As the solar panel industry experiences growth, there is a notable rise in the demand for silicon, a critical raw material used in solar panel manufacturing. This surge in demand triggers economies of scale in silicon production, as producers increase their output to meet the growing needs of the solar industry. With larger-scale production, silicon producers can spread their fixed costs over a greater number of units, leading to a decrease in the average production cost per unit.

The reduction in the production cost of silicon benefits all buyers of solar panels, including manufacturers and consumers.

- Cheaper silicon lowers solar panel prices for consumers

Solar panel manufacturers, in particular, benefit from lower input costs, allowing them to produce solar panels more cost-effectively. This cost reduction can translate into lower prices for solar panels in the market, making them more accessible and affordable to consumers. Importantly, solar panel manufacturers do not directly influence the cost reduction for silicon. Instead, it is an external economy for them, driven by market forces of silicon production. Nonetheless, they reap the benefits of this cost reduction, which contributes to the growth and sustainability of the solar energy industry.

- Creates a pool of skilled workers for businesses

### iii. Government-funded vocational training programme:

When the government introduces a vocational training programme targeting a specific skill set required in a particular industry, it effectively expands the pool of skilled labour available in the job market. This initiative addresses the skills gap and equips individuals with the expertise needed to meet the demands of the industry. As a result, businesses operating within that industry benefit significantly from increased access to a larger pool of qualified workers. For businesses, the advantages of this vocational training programme are manifold. Firstly, it reduces the time and resources spent on recruitment efforts, as there is a greater likelihood of finding suitable candidates with the necessary skills and qualifications. Additionally, businesses can save on training costs, as the newly trained workforce enters the job market already equipped with the required skill set. This not only streamlines the hiring process but also enhances productivity and efficiency within the industry.

- Government trains workers, and industries get its benefit

Importantly, individual firms within the industry do not directly contribute to the funding of the vocational training programme. Instead, the government bears the financial responsibility for its implementation and maintenance. Therefore, this initiative creates an external economy for industries, wherein they benefit from the trained workforce without incurring the associated costs of training and development. This external economy helps in industry growth, competitiveness, and sustainability, contributing to economic prosperity.

### 3.1.2.4 Negative Externalities in Production

- Heavy Pesticide Uses by Large Farms:** The use of chemical pesticides in large-scale farming operations can lead to unintended consequences, generating a ripple effect

- Large farms' pesticides pollute water for nearby organic farms

of external diseconomies. While these pesticides effectively eliminate pests and increase crop yields for the farms, they pose significant risks to nearby water sources. Contamination of water used for irrigation by smaller, organic farms can occur due to runoff or leaching of chemical residues from the treated fields.

- Pesticide use in big farms hurts organic farms and consumers

This contamination not only diminishes the crop yields of organic farms but also introduces harmful residues into their produce. As a result, consumers who purchase organic products may unknowingly be exposed to health hazards associated with pesticide exposure. This poses a threat to public health and safety, potentially leading to adverse health outcomes and undermining consumer confidence in organic farming practices. Thus, while chemical pesticides may benefit individual farms in the short term, their widespread use can have detrimental effects on the environment, neighbouring farms, and consumer well-being in the long run.

- Loud motorcycle pipes harm others with noise pollution

**ii. Loud Motorcycle Engines:** Motorcycles equipped with modified exhaust pipes often emit excessive noise, causing significant noise pollution in their vicinity. While the rider may enjoy the loud sound, this creates a negative externality for everyone else nearby. Pedestrians, residents in nearby buildings, and other drivers are all affected by the disruptive noise without any say in the matter. This noise pollution can lead to discomfort, annoyance, and even health issues for those exposed to it regularly. Additionally, it can disturb the peace and comfort of residential areas and contribute to overall environmental noise levels. As a result, controlling and regulating the use of modified exhaust pipes on motorcycles is essential to mitigate the negative impacts of noise pollution on communities and individuals.

- Amusement park brings fun, but noise and traffic for neighbours

**iii. A New Amusement Park:** The presence of an amusement park in a neighbourhood can create a diseconomy for nearby residents despite offering entertainment value. The rush of visitors, especially on weekends and holidays, often leads to increased traffic congestion in the area. This congestion can significantly impede the movement of residents, making it more challenging for them to travel in and out of their neighbourhoods during peak times. The resulting frustration and delays can diminish the quality of life for residents, impacting their daily activities and routines. Furthermore, the noise generated by crowds and amusement park rides can disrupt the peace residents previously enjoyed. As a result, while the park may provide recreational opportunities, its presence can also introduce

negative externalities that adversely affect the well-being and convenience of nearby residents.

### 3.1.3 Externalities in Consumption

- Consumption choices can affect others besides the buyer and seller

In the above-discussed topics, we typically focus on how buyers and sellers interact in a market. But what about the wider impact of our consumption choices? Consumption externalities come into play when the act of consuming a good or service affects a third party, not just the buyer and seller. These externalities can create market inefficiencies. Since consumers do not always factor in these broader costs or benefits, they might over-consume polluting goods or under-consume goods with positive externalities. Let us examine the negative consumption externality and positive consumption externality in this section.

#### 3.1.3.1 Negative Externalities in Consumption

- Smoking harms others through second-hand smoke

Externalities in economics can be associated not only with the production of goods but also with their consumption. Consumption externalities occur when the consumption of a good or service affects third parties who are not directly involved in the transaction. These externalities can be either positive or negative, depending on their impact on society. One classic example of a negative consumption externality is smoking. When individuals smoke in public spaces, they not only harm their health but also expose others to second-hand smoke, leading to health risks such as respiratory diseases. The costs of treating these health issues are often borne by society in the form of increased healthcare expenditures.

- Policies aim to make people consider externalities when consuming

The analysis of consumption externalities follows a similar framework to that of production externalities. Economists often consider ways to internalise these externalities through policy measures such as taxation, subsidies, regulations, or public awareness campaigns. For instance, governments may impose taxes on products with negative consumption externalities, like cigarettes, to discourage their consumption and offset the social costs associated with their use. Similarly, subsidies or tax incentives can be provided for activities that generate positive consumption externalities, such as installing energy-efficient technologies or participating in public health programmes. Recognising consumption externalities is crucial for policymakers, industries, and individuals alike, as it sheds light on the broader social and economic implications

of consumption choices. When societies deal with external impacts, they aim for better, fairer results that benefit everyone's well-being.

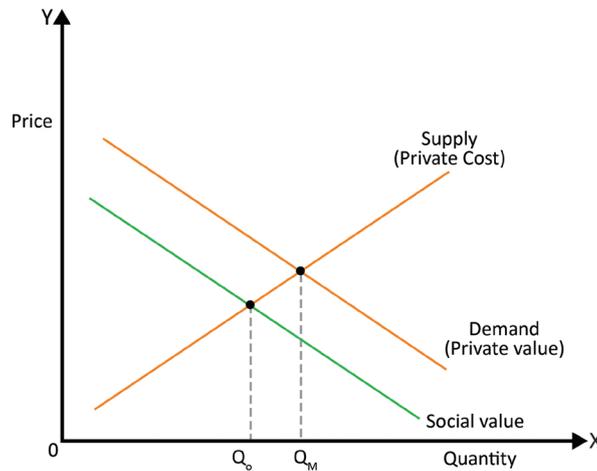


Fig: 3.1.3 Negative Consumption Externality

The above figure illustrates a situation involving a negative consumption externality, such as the case of smoking. In the figure, Demand (Private Value) represents the private value of smoking to individuals in the market. It shows how much consumers are willing to pay for each unit of cigarettes, reflecting their personal preferences, tastes, and utility derived from smoking. The Social Value (Social Cost Curve) is situated below the demand curve. This lower curve captures the full cost of smoking to society, including not only the private costs borne by smokers such as the cost of purchasing cigarettes but also the external costs imposed on others such as healthcare costs due to second-hand smoke. Equilibrium Quantity ( $Q_M$ ) is at the point where the demand curve intersects the supply curve and determines the equilibrium quantity of cigarettes traded in the market. At this quantity, the private benefits or private value of smoking equals the private costs (the cost of production and purchase).

- Social cost includes both private and external costs of smoking

However, Socially Optimal Quantity ( $Q_0$ ) from a societal perspective, is lower than the equilibrium quantity ( $Q_M$ ) determined by the private market. This is because the social cost of smoking includes not only the costs borne by smokers but also the negative externalities imposed on non-smokers, such as health issues from second-hand smoke. Thus, the above figure shows the discrepancy between the private

- Socially optimal smoking level is lower than market equilibrium

benefits represented by the demand curve and the full social costs represented by the social value curve associated with smoking. The socially optimal quantity is lower than the equilibrium quantity in the private market, indicating a market failure due to negative consumption externality. Policymakers may intervene through measures such as taxes, regulations, or public awareness campaigns to overcome the externality and move towards a more socially efficient outcome.

### 3.1.3.2 Positive Externalities in Consumption

- Renewable energy helps the environment and future generations

Positive consumption externalities are evident in the widespread adoption of renewable energy sources like solar panels by households. When households transition to renewable energy, such as solar power, they not only reduce their reliance on non-renewable sources like fossil fuels but also contribute to significant environmental benefits. By decreasing air pollution and lowering greenhouse gas emissions, these households improve environmental quality not just for themselves but for the entire community and future generations. The reduction in pollution leads to direct health benefits, including lower rates of respiratory diseases and improved overall well-being. Additionally, this shift plays a crucial role in mitigating climate change, and ensure global sustainability goals. Moreover, adopting renewable energy revives technological advancements, creates economic opportunities in the renewable energy sector, and promotes a more adaptable and sustainable energy infrastructure.

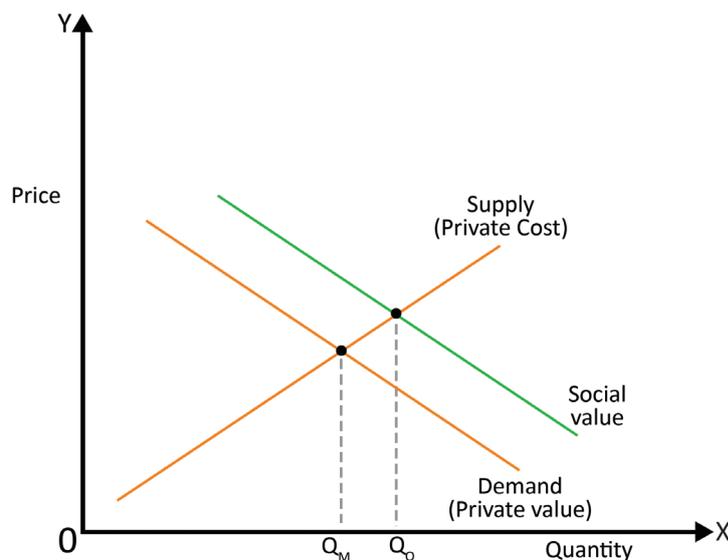


Fig: 3.1.4 Positive Consumption Externality

- Renewable energy benefits society more than its market price reflects

The above figure represents a market characterised by a positive consumption externality, specifically focusing on renewable energy sources like solar panels. The demand curve in the graph illustrates the private value of solar panels, reflecting consumers' willingness to pay based on factors such as cost savings and environmental preferences. Contrary to negative externalities, the social value curve is positioned above the demand curve, capturing not just private benefits but also the positive externalities extending to society, such as reduced pollution and climate change mitigation. At the equilibrium quantity ( $Q_M$ ), the market produces a quantity of solar panels smaller than the socially optimal quantity ( $Q_O$ ), leading to market inefficiency. To address this, government intervention becomes crucial. Policies like subsidies for goods with positive externalities, such as solar panels, will help to attain social goals. These subsidies make renewable energy more affordable, encouraging consumption levels closer to the socially optimal quantity ( $Q_O$ ) and maximising overall social welfare.

## Summarised Overview

Externalities in economics occur when someone's actions affect others without compensation. They can be positive like beautifying a neighbourhood or negative such as pollution. Market equilibrium does not consider these impacts, leading to inefficiencies. Governments intervene to address these externalities, in order to ensure overall social benefit.

Production externalities occur when a company's private costs do not include external impacts, and it will lead to overproduction. Governments intervene by integrating private costs with social costs to reach a socially optimal level of production. Production externalities, positive and negative, influence social welfare. Positive examples include government-funded port facilities, expanding solar panel industries, and vocational training programmes. Similarly, negative examples include heavy pesticide use, loud motorcycle engines, and new amusement parks causing environmental and social disruptions.

Negative consumption externalities, like smoking, impose costs on society beyond individual smokers, such as healthcare expenses. Governments intervene through taxation or regulations to address these externalities. Similarly, positive consumption externalities, like the adoption of renewable energy, benefit society by reducing pollution and improving health. Government policies, such as subsidies, promote the adoption of goods with positive externalities, ensuring a cleaner, healthier, and more prosperous future for all.

## Assignments

1. How do negative externalities in production, such as pollution from the textile industry or noise from construction sites, impact society?
2. Discuss positive externalities in production. How do these benefit society?
3. Discuss the divergence between private and social costs in production, using an example. How does this affect market efficiency?
4. How does the divergence between price and social benefit impact production and consumption decisions? Use the example of vaccinations to illustrate.
5. Analyse the role of government intervention in addressing externalities, both positive and negative, in production and consumption. Provide examples to support your explanation.

## Suggested Reading

1. Varian, H. R. (2014). *Intermediate microeconomics: A modern approach* (8th ed.). W. W. Norton & Company
2. Shapiro, C., & Varian, H. R. (2018). *Intermediate economics: Theory and applications* (10th ed.). W. W. Norton & Company

## Reference

1. Koutsoyiannis, A. (2017). *Modern microeconomics* (5th ed.). Routledge
2. Mankiw, N. G. (2020). *Principles of economics* (Eighth Edition). Cengage Learning



## UNIT 2

# Market Failure and Externalities in Resource Allocation

### Learning Outcomes

After completing this unit, learner will be able to:

- analyse the role of externalities in causing market failure
- evaluate the Coase theorem as a potential solution to externalities
- examine the challenges posed by common property resources
- know the concept of the tragedy of the commons

### Background

As you know, economics is the study of how societies allocate resources to satisfy human wants and needs. It is like a big puzzle where everyone tries to make the best choices to achieve their goals. However, sometimes things do not go as planned. Market failure occurs when the free market, where buyers and sellers interact, fails to allocate resources efficiently. In other words, the outcome is not ideal for everyone involved or for society as a whole.

One key aspect of market failure relates to externalities. As we discussed in the previous unit, externalities are the spillover effects of economic activities on third parties who are not directly involved in the transaction.

In this unit, learners were introduced with some essential concepts related to market failure. One such concept is the Coase Theorem, proposed by economist Ronald Coase. This theorem in simple terms suggests that if people can easily negotiate and make agreements, they can solve externalities on their own.

Market failure can also happen as a result of common property resources. These are resources that are collectively owned or used by many individuals. Think of public parks, fishing grounds, or clean air. Since no one owns these resources individually, they can be prone to overuse or degradation. Knowing these concepts is vital for addressing resource challenges and market failures.

## Keywords

Market Failure, Coase Theorem, Common Property Resources, Tragedy of Commons

## Discussion

### 3.2.1 Market Failure

- Free markets can sometimes fail to allocate resources efficiently

We study the concept of market failure to understand why markets sometimes do not work well for everyone. Market failure occurs when the free market, operating without intervention, fails to allocate resources efficiently. This inefficiency can result in various problems such as underproduction, overproduction, inequitable distribution of goods and services, and negative externalities that harm individuals or the environment. Competitive markets can experience failure due to four primary reasons like market power, information gaps, externalities, and public goods. Let us examine these components.

#### i. Market Power

- Monopoly power allows high prices and lower production

Imagine a town where a single company has a monopoly on producing smartphones. This company controls both the price and quantity of smartphones sold. In a competitive market, companies set prices based on their production costs, aiming for a balance where price equals marginal cost. Here, marginal cost means the cost of producing one more phone. However, a monopoly can exploit its power and set higher prices than what would be fair in a competitive market. They will produce fewer phones, choosing the level where marginal revenue equals marginal cost instead of price. This decision to produce fewer phones affects the allocation of resources.

When the phone company makes fewer phones, they use less workers and materials to make them. These workers and materials might be used to make tablets instead. The increased demand for tablets then drives up the cost of producing each additional tablet, making tablets more expensive to produce. This scenario demonstrates how market power can lead to inefficient resource allocation. The ideal balance between smartphone and tablet production is disrupted, impacting both industries' costs and prices. This inefficiency is reflected in

- Monopoly power creates inefficiency by wasting resources

the Marginal Rate of Transformation (MRT), which measures the trade-off between producing different goods. With market power, the MRT is distorted because production decisions prioritise profit margins rather than social costs, leading to an inefficient allocation of resources.

- Strong unions can also cause resource inefficiency

Furthermore, market power can also arise from strong unions representing workers. For example, imagine a union in the healthcare sector successfully negotiates high wages for nurses. This might attract more workers to the healthcare industry, leading to a shortage of skilled workers in other sectors like education. This input inefficiency, where resources; in this case, labour are not allocated optimally across industries, can disrupt the economy's overall efficiency and productivity. Thus, we can say that, whether it is through monopolies controlling product markets or unions influencing labour markets, market power can distort production decisions, leading to inefficiencies in resource allocation and ultimately affecting the economy's performance.

## ii. Incomplete Information

- Lack of information in a market can lead to bad consumer choices

Imagine you are in the market for a new car. You want to make an informed decision based on factors like safety ratings, fuel efficiency, and reliability. However, if crucial information about these aspects is missing or unreliable, it can disrupt the market's efficiency and lead to undesirable outcomes. One consequence of information asymmetry in the automotive industry is quality variation. Without accurate information about a car's performance or safety features, consumers might end up purchasing vehicles that do not meet their expectations. This could result in dissatisfaction and potential safety concerns if the cars do not perform as advertised. Another issue is the presence of hidden costs. For instance, imagine buying a car at a seemingly low price, only to discover later that it requires expensive maintenance or has high fuel consumption. Consumers may feel cheated and face financial burdens they did not anticipate due to insufficient information upfront.

- Information gaps can lead to consumers buying unsafe products

Safety is also a significant concern in markets with information asymmetry. If car manufacturers do not provide transparent data about safety features or crash test results, consumers may unknowingly purchase vehicles with inadequate safety measures, putting themselves and others at risk on the road. In essence, incomplete information, where one party (producer) has more knowledge than the other (consumer), can lead to

inefficiencies in the market. Consumers make bad choices and producers create products nobody truly needs.

### iii. Externalities

- Externalities are costs or benefits not reflected in market prices

The price system is typically efficient because it conveys information to both producers and consumers. However, there are instances where market prices do not accurately represent the actions of either group. This occurs when there is an externality, meaning that a consumption or production activity has indirect effects on others that are not reflected in market prices. The term ‘externality’ is used because these effects, whether benefits or costs, are external to the market. For example, imagine a company that produces cheap plastic products but does not properly dispose of its plastic waste. This will lead to pollution in nearby rivers and harming aquatic life. This pollution is an externality because the company does not pay for the environmental damage caused by its waste disposal practices. As a result, the true cost of producing plastic products is not reflected in their market price.

- Externalities lead to the overproduction of things that harm society

Similarly, consider the case of a factory that emits harmful pollutants into the air, contributing to air pollution and respiratory health issues in the surrounding community. The costs of healthcare and reduced quality of life for affected individuals are externalities not accounted for in the market price of the goods produced by the factory. In both examples, the externality leads to inefficiencies. The companies do not bear the full costs of their actions, so they may overproduce harmful products or pollutants, causing input inefficiencies. If this externality is widespread across industries, it can also lead to output inefficiencies, where too much of certain goods are produced at lower prices than they would be if the true costs were considered.

### iv. Public Goods

Another source of market failure occurs when markets do not provide goods that many people value. These are called public goods, which can be shared among many consumers at a low cost per person. However, once provided to some consumers, it is challenging to exclude others from benefiting. For instance, think of a public park in a city. Once the park is built and open to the public, anyone can use it without paying individually, making it difficult to prevent overcrowding or misuse. Consider another example involving scientific

- Public goods provide benefits to all without easy pricing mechanisms

research. Imagine a company investing in research to develop a cure for a rare disease. Once the cure is discovered and shared with the public, other companies or individuals can replicate it without bearing the costs of research. This lack of exclusivity makes it challenging for the initial company to recoup its investment, leading to underinvestment in research and development for such treatments.

- Governments provide public goods due to market undersupply and inefficiency

Because public goods are undersupplied by markets due to their non-excludable nature, governments often step in to address this issue. One way is by directly providing public goods themselves, such as building and maintaining public infrastructure like roads or bridges. Another approach is to incentivise private firms to produce public goods through mechanisms like subsidies or tax credits. For instance, the government might offer tax breaks to companies that invest in renewable energy technologies, which benefit society as a whole but may not be profitable for individual firms without incentives. In reality, market failure related to public goods occurs when markets undersupply goods that benefit many people but are difficult to exclude others from using. Governments play a crucial role in addressing this by either providing public goods directly or creating incentives for private firms to produce them, ensuring these valuable goods are available to society.

- Externalities solved by private agreements

### 3.2.2 Coase Theorem

In 1960, R.H. Coase introduced a ground-breaking idea about addressing externalities without government intervention. He argued that when property rights are clearly defined, individuals and businesses can negotiate and resolve externalities through private agreements. For instance, if someone's actions create negative effects on others, they can compensate those affected without government interference. This concept, known as the Coase theorem, examines the potential for market mechanisms to efficiently handle externalities by facilitating private negotiations.

The Coase theorem emphasises on how having clear property rights can promote the efficient allocation of resources. The theorem proposes that an efficient solution to externalities situations where one party's actions affect another party can be achieved if property rights are well-defined. According to the theorem, as long as transaction costs (the costs of negotiating

- Clear property rights allow parties to negotiate and resolve externalities

and enforcing agreements) are zero, and property rights are clear, parties can negotiate to correct for the externality. This negotiation will lead to an efficient allocation of resources, regardless of who initially holds the property rights. The theorem assumes perfect competition in the market, no income or wealth effects from the negotiations, and no free rider effects, meaning that everyone involved in the externality has well-defined property rights and participates in the bargaining process.

The key Features of the Coase Theorem can be stated as follows.

- a. Zero transaction costs:** No costs are involved in the bargaining process between parties.
- b. Well-defined property rights:** Clear ownership rights are established for the resources in question.
- c. Perfect competition:** The market operates under conditions of perfect competition.
- d. No income or wealth effects:** The outcome of the negotiation does not alter the income or wealth of the parties involved.
- e. No free rider effects:** All parties with an interest in the externality participate in the negotiation without relying on others to solve the problem.

- Coase Theorem assumes ideal market conditions

However, it is important to note that the theorem's effectiveness relies on ideal market conditions, which may not always exist in real-world scenarios. Let us understand the concept with an illustration.

- Negotiating for noise pollution benefits both households through cooperation

Consider a scenario in an Indian neighbourhood where two households, Anand and Maya, come across an externality issue concerning noise pollution. Anand operates a metal fabrication workshop from his home, and the loud machinery noises disturb the peaceful environment of Maya's adjacent residence. This situation represents a negative externality for Maya, as the noise disrupts her daily life and causes discomfort. Applying the Coase theorem to this situation involves evaluating the benefits Anand derives from running his workshop against the costs Maya incurs due to noise pollution. Maya can propose potential solutions to mitigate the noise, such as installing soundproofing materials or adjusting

the workshop's operating hours to minimise disturbances. She offers to compensate Anand for implementing these changes, aiming for a mutually beneficial agreement.

- Negotiation can lead to a win-win situation

If Maya's offer surpasses the benefits Anand receives from operating the workshop, they can reach an agreement. For instance, if Anand earns ₹15,000 monthly from the workshop while Maya experiences ₹20,000 worth of discomfort due to noise, Maya can offer Anand more than ₹15,000 or less than ₹20,000 to implement noise reduction measures. This arrangement benefits both parties economically and in terms of a quieter living environment, achieving an efficient outcome through private negotiations.

- Anand's workshop continues if his gains exceed Maya's discomfort

However, if Anand's benefits significantly outweigh Maya's costs (e.g., Anand earns ₹30,000 from the workshop while Maya experiences ₹20,000 worth of discomfort), negotiations may not lead to an agreement. In this case, Anand would turn down any offer below Rs 30,000, while Maya would not offer any amount above Rs 20,000. Therefore, Anand ends up keeping running the workshop. Given these costs and benefits, however, this outcome is also efficient. Efficiency, in this context, means that resources are allocated in a way that maximises overall benefits. In the case mentioned, the benefits to Anand from running the workshop outweigh the costs imposed on Maya from noise pollution. Therefore, allowing Anand to continue operating the workshop results in a net gain in social welfare, as long as the benefits to Anand exceed the costs to Maya. The Coase theorem highlights that the initial allocation of rights (e.g., Anand's right to operate the workshop or Maya's right to a quiet environment) does not hinder the efficiency of negotiations. Market bargaining can still result in a solution where both parties benefit, addressing the externality problem effectively.

Despite its logical appeal, the Coase theorem has several limitations. One key limitation is that private actors often struggle to resolve externalities on their own. The theorem assumes that interested parties can easily reach and enforce agreements, but this is not always the case. In reality, bargaining may fail even when a beneficial agreement is possible, primarily due to transaction costs. These costs, incurred during the negotiation and enforcement process, can hinder successful agreements. Additionally, the difficulty increases when dealing with a large number of interested

- Transaction costs limit the effectiveness of the Coase theorem

parties, as coordination becomes more complex and costlier. This complexity can make it challenging to achieve an efficient bargain, and shows a significant limitation of the Coase theorem in addressing externality problems.

### 3.2.3 Common Property Resources

- Free access can lead to overuse problems

Common property resources are those to which anyone has free access. This free access to common property resources can sometimes lead to externalities. Let us consider the example of a public park in a city. Public parks are common property resources where anyone can access and enjoy green space, playgrounds, and recreational facilities. While public parks provide numerous benefits such as relaxation, exercise, and community gathering, they can also face challenges due to their common property nature. Imagine a popular public park with well-maintained grass, benches, and walking trails. Since the park is freely accessible to everyone, visitors may not feel compelled to consider their impact on the park's resources. For instance, individuals might litter, damage park facilities, or overcrowd certain areas during events or weekends.

- Public park overuse reduces enjoyment for everyone

Each visitor to the park enjoys the benefits of using the space without paying directly for its upkeep or maintenance. However, the collective actions of visitors, such as littering or overcrowding, can lead to negative externalities that reduce the overall quality of the park experience. Excessive littering can make the park less appealing, overcrowding can lead to wear and tear of facilities, and unchecked behaviour can create safety concerns. In this case, the park represents a common property resource where individuals enjoy the benefits without fully considering the costs imposed on others or the long-term sustainability of the park. This can result in inefficiencies such as increased maintenance costs, reduced aesthetic appeal, and diminished recreational value for the community.

Imagine a big pond inside a park where anyone can fish. Here, the big pond is a common property resource. The given figure illustrates what happens when there are no limits on how much fish people can catch.

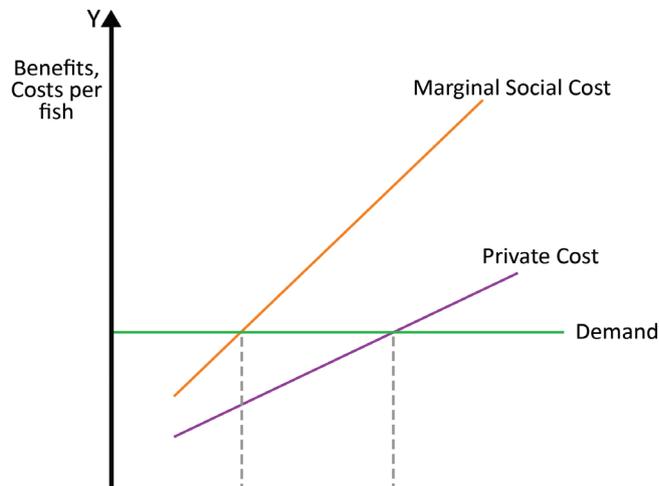


Fig: 3.2.1 Common Property Resources

- Free access fishing harms everyone in the long run

In the above figure, each person fishes until the extra fish they catch (marginal revenue) equals their own cost (bait, time). But this only considers their individual experience, not the impact on others. The pond's fish population is a shared resource, and overfishing depletes it for everyone. The graph shows two cost curves. The lower one reflects the individual cost (bait, time). The higher curve considers the social cost, which includes the individual's cost plus the cost to society of fewer fish available for everyone. The cost to society here is the depletion of the fish population. With free access, people keep fishing until there is no more personal profit to be made at point  $F_c$ . This point ( $F_c$ ), however, represents overfishing because the social cost outweighs the individual benefit. The ideal scenario is point  $F^*$  on the graph. There are still fish left beyond  $F^*$ , but not enough to sustain the pond's health and provide good fishing for everyone in the long run. At point  $F^*$ , the number of fish caught balances the benefits people get from fishing with the social cost of maintaining a healthy fish population. This might involve limiting the number of fishes caught per person or the total catch allowed from the pond each month.

One solution to the issue is to appoint a single owner to manage the pond; like a park ranger who sets a fee to fishing. This fee would reflect the social cost, including maintaining the fish population. Facing a fee, people would adjust their behaviour

- Limited fishing or fees stop the overuse of common resources

and fish within the sustainable limit ( $F^*$ ). However, managing vast common property resources can be complex. In the real world, government regulations or park policies often play a role in limiting fishing or allocating quotas, similar to the ‘monthly total allowable catch’ in some fisheries. This helps to ensure the pond or fishery remains enjoyable for everyone and the fish population stays healthy.

- Common resources are freely accessible but diminish with use

### 3.2.4 Tragedy of Commons

Common resources, unlike private goods, are freely accessible to everyone without any cost, much like public goods. However, they differ in that they are rivalrous, which means when one person uses the resource, it diminishes its availability for others. This creates a new challenge because policymakers must then consider how much the resource should be used once it is made available. This dilemma is best illustrated by the Tragedy of the Commons, a famous example that illustrates the consequences of unregulated use of common resources leading to depletion or overuse due to individual self-interest.

- Shared resources can be ruined by overuse for personal gain

The term Tragedy of Commons comes from England in the 14th century. In England, there existed common grazing areas surrounding villages. Sheep raising was a vital economic activity there, with families selling wool for clothing. The land used for grazing, called the Town Common, was collectively owned by the residents. Initially, with plenty of land, free grazing was not an issue. However, as the town grew, so did the number of sheep, leading to overgrazing and barren land. The tragedy occurred because each family focused on their own flock’s size, neglecting the collective damage to the Town Common. This situation, known as the Tragedy of the Commons, arises due to individual actions causing harm to shared resources.

The Tragedy of the Commons teaches us an important lesson. When individuals use a shared resource, it can reduce the benefits available to others. This negative impact on others is known as a negative externality. Common resources, such as grazing lands or fisheries, often face this challenge because they are accessible to all without cost. This free access leads to overuse or depletion of the resource, as each user aims to maximise their benefits without considering the broader consequences. To address this issue, governments can intervene by implementing regulations or taxes to limit

- Overuse of common resources leads to negative impacts

the use of the common resource. For example, setting quotas on fishing to prevent overfishing or imposing fees on using public parks to prevent overcrowding. Another approach is to convert the common resource into a private good by assigning ownership or usage rights. This shift to private ownership creates incentives for responsible management and prevents the tragedy of overuse seen with common resources.

### 3.2.4.1 Some Important Common Resources

Common resources can be seen in various forms, and they typically encounter the same challenge seen in the Tragedy of the Commons. Private individuals tend to overuse these shared resources. This overuse stems from each individual's self-interest, disregarding the collective impact on the sustainability of resources.

- Governments use Pigouvian taxes to protect resources

**Clean Air and Water:** These are crucial common resources that everyone benefits from. However, pollution from industries and vehicles can harm the quality of air and water, affecting everyone leading to negative externality. To address this, governments can impose regulations on emissions or implement taxes like Pigouvian taxes on polluting activities to discourage pollution and protect these vital resources. Pigouvian taxes are charges imposed on goods or activities that cause negative effects on society, like pollution or congestion. The goal is to make these harmful things more expensive, encouraging people or industries to use them less or find cleaner alternatives.

- Government regulates shared oil pool extraction

**Oil Pools:** When multiple owners share ownership of an oil pool or similar resource, managing its extraction becomes complex. Government regulation becomes necessary to ensure fair and efficient use of the resource. Regulations might include guidelines on extraction rates, environmental protection measures, and revenue-sharing arrangements among the owners.

- Governments use tolls to ease congestion

**Roads:** Roads are often considered public goods, but when they become congested, they turn into common resources where each additional user adds to the congestion for others. This will give rise to a negative externality. To ease congestion, governments can implement tolls or congestion pricing, where drivers pay a fee to use the road during peak times, encouraging more efficient use and reducing traffic jams.

- Global cooperation needed for wildlife conservation

**Fish, Whales, and Wildlife:** These natural resources are shared globally, and overfishing or excessive whaling can lead to the depletion of these populations. This will impact the ecosystems and economies reliant on them. International cooperation and agreements are essential to regulate fishing quotas, protect endangered species, and ensure the sustainable use of these common resources for future generations.

- Government intervention vital for resource sustainability

Common resources and wildlife face challenges of overuse and negative externalities. These challenges necessitate government intervention through regulations, taxes, international cooperation, or other measures to ensure sustainable management and equitable access to these vital resources. By implementing effective policies, societies can strike a balance between individual interests and the common good, safeguarding these resources for current and future generations.

## Summarised Overview

Market failure occurs when the free market fails to efficiently allocate resources, resulting in outcomes that are not optimal for society. It is caused by factors such as market power, incomplete information, externalities, and public goods. Market power, often used by monopolies, can lead to overpricing, underproduction, and disruptions in resource allocation across industries. Incomplete information between buyers and sellers can result in quality variations, hidden costs, and safety concerns, causing market inefficiencies. Externalities arise when the actions of producers or consumers have indirect effects on others not reflected in market prices, leading to overproduction and input inefficiencies. Public goods, which are non-excludable, are undersupplied by markets, requiring government intervention to ensure their provision.

The Coase Theorem, introduced by R.H. Coase in 1960, suggests that clear property rights can facilitate private negotiations to address externalities without government intervention. It asserts that parties affected by externalities can negotiate solutions where the responsible party compensates those affected.

Common property resources, like public parks, face challenges due to free access, leading to negative externalities such as overcrowding and resource depletion. The Tragedy of the Commons illustrates the consequences of unregulated use of common resources, where individual self-interest leads to overuse and depletion. Governments can address these issues through regulations, taxes, or converting common resources into private goods to ensure sustainable management and equitable access. Effective policies strike a balance between individual interests and the common good, safeguarding vital resources for current and future generations.

## Assignments

1. Explain the concept of market failure and provide examples of factors contributing to it.
2. Discuss the role of incomplete information in disrupting market efficiency. Provide examples from industries where incomplete information leads to undesirable outcomes.
3. Describe the Coase Theorem and its significance in addressing externalities without government intervention. Provide an example of where the Coase Theorem could be applied.
4. Explain the concept of common property resources and the challenges they face. Provide examples of common property resources and the negative externalities associated with them.
5. Discuss the Tragedy of the Commons and its implications for the sustainable use of resources. Provide historical or contemporary examples of the Tragedy of the Commons.

## Suggested Reading

1. Krugman, P. R., & Wells, R. (2005). *Microeconomics* (2nd ed.). Worth Publishers.
2. Mandal, R. K. (2007). *Microeconomic theory*. Atlantic Publishers (P) Ltd.
3. Coase, R. H. (1988). *The firm, the market, and the law* (2nd ed.). University of Chicago Press.

## Reference

1. Pindyck, R. S., & Rubinfeld, D. L. (2017). *Microeconomics* (8th ed.). Pearson Education.
2. Mankiw, N. G. (2020). *Principles of economics* (Eighth Edition). Cengage Learning
3. Parkin, M. (2012). *Microeconomics* (Tenth Edition). Pearson Education.



## UNIT 3

# Public Goods and Market Challenges

### Learning Outcomes

After completing this unit, learner will be able to:

- identify characteristics of public goods
- analyse strategies to ease the free rider problem
- apply the concept of Pareto efficiency
- understand Lindahl pricing in addressing the problem of financing public goods

### Background

The concept of market efficiency is fundamental in economics. However, markets can fail, leading to inefficient resource allocation. One particular type of market failure relates to the provision of public goods. Public goods are goods that are non-excludable and non-rivalrous in consumption. Non-excludable means that individuals cannot be effectively excluded from using the good, and non-rivalrous means that one person's consumption of the good does not diminish its availability to others. Classic examples of public goods include national defence, street lighting, public parks, etc.

However, the provision of public goods faces a unique challenge known as the free rider problem. Because public goods are non-excludable, individuals can benefit from them without contributing to their provision. This creates an incentive for individuals to 'free ride' on the contributions of others, leading to under-provision or inefficient allocation of public goods.

From your undergraduate studies, learners may be aware that Pareto efficiency is a concept used to evaluate the efficiency of resource allocation. An allocation of resources is said to be Pareto efficient if no individual can be made better off without making someone else worse off. Achieving Pareto efficiency is often considered an ideal outcome in economics, as it represents a situation where resources are allocated in the most efficient manner

possible.

One approach to addressing the problem of financing public goods is through Lindahl pricing. Lindahl pricing involves determining the optimal contribution or tax rate for individuals based on their willingness to pay for public goods. Lindahl pricing aims to achieve efficient provision of public goods while ensuring that individuals bear the costs in proportion to the benefits they receive.

From this unit, learners will get a good understanding of concepts like public goods, market failure, free rider problem, Pareto efficiency, and Lindahl pricing. It will equip learners in understanding how they impact resource allocation, and welfare, and why government intervention is necessary to tackle market failures effectively.

## Keywords

Public Goods, Market Failure, Free Rider Problem, Pareto Efficiency, Lindahl Pricing

## Discussion

### 3.3.1 Public Goods

Governments play a crucial role in providing public goods that benefit everyone in society. For instance, they invest in infrastructure like roads, bridges, and public transportation systems. These infrastructure projects make it easier for people to travel, commute to work, and transport goods, benefiting everyone regardless of whether they directly contribute to the funding through taxes. Another example is healthcare services provided by the government. In India, we have public healthcare systems that ensure citizens to have access to essential medical care and treatments, promoting public health and well-being. This benefits everyone by reducing the spread of diseases and ensuring timely medical interventions. Additionally, governments often invest in education by funding public schools and universities. This ensures that all citizens, regardless of their financial background, have access to quality education, which is crucial for personal development and economic growth. A well-educated population contributes to a skilled workforce and a more competitive economy.

- Governments provide public goods for social benefit

These examples illustrate how governments provide public goods and services that benefit society as a whole. Just like

- Private market fails to provide public goods efficiently

labour unions, professional associations, or clubs provide benefits to their members, governments serve all citizens by creating a conducive environment for economic and social activities through infrastructure, healthcare, education, and other public services. Thus, Public goods are things that are available to everyone in society, and one person's use of them does not reduce the amount available for others. These goods are typically provided by governments because the market may not adequately supply them due to the difficulty in excluding non-payers and the lack of rivalry in consumption.

### 3.3.1.1 Characteristics of Public Goods

- Public goods lack exclusivity and rivalry in consumption

The idea of public goods can seem tricky to define because governments are often seen as the ones who provide these goods, and public goods are seen as what governments produce. However, economists like Paul Samuelson have tried to give a more specific definition to public goods by focusing on two key characteristics. They are non-exclusivity and non-rivalry. These features help economists to separate goods that are naturally suited for public provision like parks or lighthouses from those that can be handled by private markets like most everyday items you buy.

The two peculiar characteristics of public goods are as follows.

#### i. Non-Exclusivity

- Public goods benefit everyone, even those who do not pay

The main difference between public goods and things you buy in stores i.e., private goods is that you cannot be easily shut out of enjoying public goods. Imagine a delicious cake in a bakery; you cannot enjoy it unless you pay. On the other hand, once a public good exists, everyone gets the benefit. National defence is a classic example. The army protects everyone, even those who do not pay for it. The same goes for local things like mosquito control. Once the spraying happens, everyone benefits from fewer mosquitos, whether they pay or not. This creates a problem that people might think 'Why pay if someone else will?'. That is why public goods are tricky for stores to sell because everyone would want the benefit without paying. Thus, public goods are those goods which are once provided, it is not possible to exclude people from using them even if they have not paid.

#### ii. Non-Rivalry

Public goods are not just about not being excluded; they are

- Pricing public goods difficult for markets

also about non-rivalry. Non-rivalry means one person's use does not diminish its availability for others. Consider the production of a loaf of bread. Producing an additional loaf of bread incurs marginal costs due to the resources and effort required, such as flour, water, yeast, and energy. That is not the case with public goods. One more car crossing a bridge at night when traffic is low does not affect how many others can use it. The bridge is already there, so the cost of letting another car pass is practically zero. Similar logic applies to things like watching a public TV channel. More viewers do not use up the signal or prevent others from enjoying the programme. This nonrival aspect creates a problem for markets. Normally, the ideal price for something reflects its production cost. But for nonrival goods, the extra cost of serving another person is zero. So, if a market tried to sell these goods, the price would have to be zero; which would not be profitable for any seller. This is why public goods are often provided by the government, as a way to ensure everyone has access despite the challenges for private markets.

### 3.3.2 Public Goods and Market Failure

- Public projects face challenges due to free-riding behaviour

Just visualise about a public sanitation project in a densely populated town in India. Installing and maintaining public toilets and waste disposal services can greatly improve hygiene and public health for everyone in the area. However, it is challenging to ensure that every household contributes financially to cover the costs. Some households may not see the immediate benefit or may simply choose not to pay, relying on others to fund the project. Likewise, public goods like mosquito abatement pose a challenge for private markets because of two key features viz; non-exclusion and free riders. Imagine you want to offer a mosquito spraying programme in your town with a population of ten thousand households. It would cost Rs 50,000, but the benefit to everyone would be much higher. To break even, you would need everyone in the 10,000 households to pay Rs 5. But the problem is, you cannot force them to pay, and you cannot charge more to those who value it most.

This is because of the following two features;

- Non-exclusion:** Once you spray the town, everyone benefits from fewer mosquitos, regardless of whether they paid. There is no way to keep someone out who did not contribute.

- Free riders benefit without paying for public good

**b. Free riders:** Knowing this, people might be tempted to act as ‘free riders’. They might undervalue the programme or simply not pay, figuring they will enjoy the benefit anyway since everyone gets sprayed.

- Free riders hinder private market efficiency

This free-rider problem makes it difficult for private markets to efficiently provide public goods. In small groups with a low-cost programme, everyone might agree to contribute voluntarily. But with many people involved, like the example in your town, a private company would struggle to collect payments and deal with free riders. This is why governments often take on public goods. They can raise funds through taxes and ensure everyone gets the benefit, even if some do not pay directly. Public goods are essential for a well-functioning society, but provision for public goods can lead to market failure due to its characteristics like non-excludability, free-rider problem, and lack of market demand. Markets often need government intervention to ensure their efficient provision.

### 3.3.3 Free Rider Problem

- Free riders benefit without paying their share

Free rider problem happens because public goods, like parks or streetlights, are available to everyone regardless of whether they pay for them or not. People might not want to pay their fair share because they know they will still get the benefits anyway. This creates a problem because if everyone acts this way, no one will want to pay for public goods. This will lead to market failure because individuals acting in their interest do not lead to the best outcome for everyone. Hence, a free rider is someone who enjoys the benefits of something without paying their fair share for it.

- Free rider enjoys garden, but does not contribute

Suppose, in a neighbourhood where residents collectively maintain a community garden. They come together to plant vegetables, and flowers, and maintain the garden regularly. The produce from the garden is shared among all participants. Now, there is a member of the neighbourhood who enjoys the benefits of the community garden but never contributes to its upkeep. In this situation, this person is a free rider. They are reaping the benefits of the community garden without putting in any effort or contributing to its maintenance. If too many people in the neighbourhood adopt this mindset, the burden of maintaining the garden falls on fewer individuals, leading to resentment, and ultimately a decline in the quality of the garden for everyone.

### 3.3.3.1 Possible Solutions to the Free Rider Problem

- Assurance contracts ensure contributions to public projects

- Beneficiaries create public goods by pooling resources

- Government-funded goods benefit everyone, despite contributions

- Subsidies support beneficial production or consumption

**a. Dominant Assurance Contracts:** Dominant Assurance Contracts are agreements where people commit to contributing money for a public project, like building a park, but only if enough others also pledge to contribute. If the required number of pledges is not met, everyone gets their money back. In a ‘dominant’ version of this, an entrepreneur guarantees to refund the initial pledge plus extra money if the goal is not reached. This setup makes it a smart move for everyone to pledge money, no matter what others do, because they will either help build the project or get their money back with a bonus. It is like a win-win situation that encourages everyone to contribute to the greater good.

**b. Coasian Solution:** The Coasian solution, attributed to economist Ronald Coase. He proposes that individuals who benefit from a public good can come together, pool their resources based on their willingness to pay, and create the public good themselves. Coase argued that if transaction costs are low enough and it is easy for beneficiaries to find each other and agree on contributions, public goods can be adequately provided even without government intervention, even in a competitive market setting.

**c. Government Provision:** Government Provision involves the government using taxation to fund goods and services that benefit everyone, even if individuals do not voluntarily contribute. Challenges include determining funding allocation and cost division. Sometimes, public goods are provided without direct charges, such as clean air regulations. In reality, government provision ensures essential services for all citizens, regardless of direct payment.

**d. Subsidies:** Subsidies are financial aids given by governments to support businesses or individuals in producing or purchasing things that benefit society, such as clean energy or education. These subsidies aim to encourage the production or consumption of these beneficial goods and services. However, there is a risk of unfairness or favouritism, known as cronyism, where certain industries or individuals receive preferential treatment. To prevent this, subsidies can be distributed through secret bidding or clear rules to ensure fairness and transparency in the allocation process. This helps to manage the risks associated with subsidies and ensures they are used effectively for the greater good.

- Privileged groups produce excess public goods, benefiting the community

**e. Privileged Group:** Privileged groups are individuals or groups who benefit more from producing public goods than the actual cost of producing them. For instance, a shop owner installing a street light not only illuminates their own shop but also benefits neighbouring businesses by attracting customers. However, relying solely on privileged groups to produce public goods does not always solve the free rider problem entirely, as there may still be underproduction. This means that even though some individuals or groups are willing to provide public goods, the overall quantity produced may not be sufficient to meet the needs of the entire community.

- Merging of free riders is not feasible for large markets

**f. Merging of Free Riders:** Another solution is to address the free rider problem by incorporating potential free riders into the system. For instance, if a property developer owns a whole street, they can include street lights as part of the development plan, benefiting everyone who lives there. However, this approach could still lead to monopoly problems, where one entity has excessive control over a market, which may not be ideal. Additionally, this strategy may not work well in larger markets where it is challenging to buy out all potential free riders due to the scale and diversity of the population.

- Intellectual property rights prevent unauthorised reproduction

**g. Legislated Exclusion:** Intellectual property rights, such as copyrights and patents, offer a solution to the free rider problem for information goods by preventing unauthorised reproduction. However, these laws can inadvertently lead to private monopolies where one entity has exclusive control over a product or idea, which limits competition and potentially harm consumers. Additionally, while these laws aim to protect creators and encourage innovation, they may not always strike the right balance between rewarding innovation and promoting public access to information. As a result, there is a need for careful consideration and regulation to ensure that intellectual property rights serve the interests of both creators and the public.

**h. Non-Individualism:** Public goods can also be supplied through non-market methods, such as community spirit and shared social values. When individuals act with a sense of community responsibility, they voluntarily contribute to the provision of public goods without government involvement. This voluntary cooperation relies on people's willingness to work together for the common good, devel-

- Community works together for public goods

oping a sense of solidarity and mutual support within communities. By accepting collective action and shared norms, communities can effectively address the provision of public goods, reducing reliance on government intervention and promoting a sense of ownership and management over shared resources.

### 3.3.4 Public Goods and Pareto Efficiency

- Pareto optimality balances benefits and costs efficiently

The free rider problem emphasises the challenge of efficiently producing public goods, as individuals may benefit without contributing, leading to suboptimal outcomes. Pareto optimality, a fundamental economic concept, seeks to maximise overall benefits without harming anyone. In the domain of public goods, where benefits are shared by many simultaneously, we evaluate collective willingness to pay rather than individual contributions. This approach ensures efficient resource allocation by balancing total social benefit with production costs. For example, in a pollution control project benefiting individuals A and B, Pareto optimality guides us in determining the production level where total social benefit equals production cost, a maximising benefit for all while minimising waste.

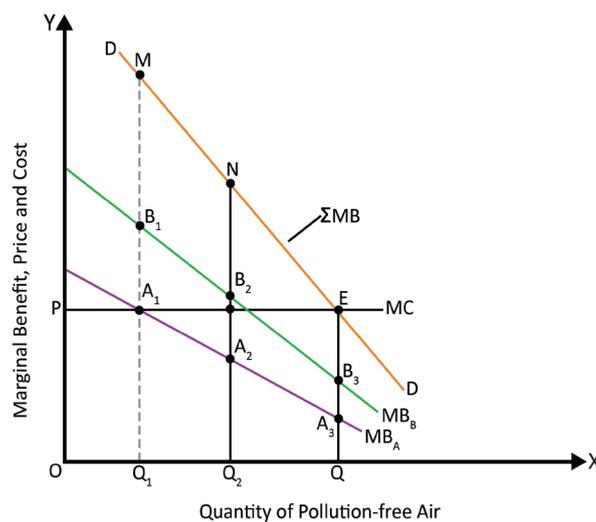


Fig: 3.3.1 Public Goods and Pareto Optimality

In the figure above, the marginal benefit curves  $MB_A$  and  $MB_B$  represent individual preferences or demand for pollution-free air depicted for individuals A and B respectively. These curves

- Individuals have varying preferences for pollution-free air

illustrate the varying prices each individual is willing to pay for different quantities of pollution control. For instance, individual A is willing to pay the price  $Q_1 A_1$  for a quantity of pollution-free air represented by  $OQ_1$ , while individual B is willing to pay the price  $Q_1 B_1$  for the same quantity. Similarly, for a quantity of pollution-free air represented by  $OQ_2$ , individual A is willing to pay price  $Q_2 A_2$  and individual B is willing to pay price  $Q_2 B_2$ .

- Individual Preferences impact resource allocation for public goods

The marginal benefit curves serve as demand curves for pollution-free air, indicating the maximum price each individual is willing to pay for different levels of pollution control. These prices are influenced by individual's subjective values assigned to varying quantities of pollution-free air, reflecting the subjective nature of preferences regarding public goods. Unlike private goods, determining the Pareto optimal quantity of pollution-free air requires establishing the total market demand curve. Public goods like pollution control are non-rivalrous, allowing multiple individuals to benefit simultaneously. Therefore, aggregating demand for public goods involves recognising the collective welfare of the community and the contributions of all individuals. This process leads to the establishment of an aggregate marginal benefit curve, ensuring efficient allocation of resources to maximise social welfare.

- Demand is found by vertically summing individual willingness to pay

As in the above figure, individual A is willing to pay price  $Q_1 A_1$  for a quantity of pollution-free air, and individual B is willing to pay price  $Q_1 B_1$  for the same quantity consumed simultaneously. Therefore, for  $OQ_1$  quantity of clean air, the total price they are willing to pay equals  $Q_1 A_1 + Q_1 B_1 = Q_1 M$ . Similarly, for  $OQ_2$  quantity, individual A is willing to pay  $Q_2 A_2$  and individual B is willing to pay  $Q_2 B_2$ , resulting in a total price of  $Q_2 A_2 + Q_2 B_2 = Q_2 N$ . This demonstrates that in the market for public goods, the demand curve is derived by vertically summing the individual demand curves since each person consumes the same units of the good simultaneously.

In determining the Pareto efficient output of a public good, society considers production costs alongside aggregate benefits. With a constant marginal cost (MC) of production, represented as  $OP$  per unit in the figure, the MC curve is established. If we consider the value individuals A and B place on pollution-free air, they each have their levels of benefit; i.e.,  $QA_3$  for A and  $QB_3$  for B. If both are willing to pay prices

- Pareto efficiency is when marginal benefit equals marginal cost

equal to these benefits, then when combined, they will pay a total of OP for the amount of pollution free air that is Pareto efficient OQ. In simpler terms, if we add up what A and B are willing to pay for clean air, it equals the total price they will pay together for the amount of clean air that is best for everyone. At the quantity OQ of pollution free air, the price individuals are willing to pay equals MC, reflecting aggregate marginal benefit. Thus, at OQ where aggregate marginal benefit equals MC, social welfare is maximised, representing the combined benefits of both individuals. OQ thus signifies the Pareto efficient output level of the public good, where resources are optimally allocated to maximise social welfare.

### 3.3.5 Lindahl Pricing

- Pay for public good based on the benefit

Lindahl pricing is a concept named after the Swedish economist Erik Lindahl. It refers to a method of funding public goods and services where individuals voluntarily contribute towards the cost of these goods based on the benefits they receive. In Lindahl pricing, each individual's contribution is determined by their willingness to pay for the public good, reflecting their preferences and the value they place on it. In his Voluntary Exchange Theory, Lindahl addresses how public goods and services, unlike private goods, cannot be efficiently allocated through prices because everyone in society benefits regardless of payment, leading to 'free riders'. Despite this challenge, Lindahl proposed a theory based on the idea that individuals voluntarily contribute towards public goods and services in proportion to the benefits they receive. This means those who benefit more would pay more towards their provision. Though not perfect, this approach aims to imitate the efficiency of the price mechanism seen in private markets, providing a framework for funding public goods and services.

- Balances public spending and tax distribution

In Erik Lindahl's theory, he focuses on how public spending decisions are made alongside figuring out who in the community should bear the tax burden. He compares this process to how prices work in regular markets to balance supply and demand. Just like prices guide how much people buy and sell in a market, the distribution ratio of the tax burden guides how much public spending happens and who pays for it in a community. This ensures that the right amount of public goods and services are provided while fairly distributing the costs among different groups. This theory looks at how much the government spends and how it raises that money through three choices.

- Balancing tax burden between individuals

Imagine the government needs a set amount of money from two people, A and B. Lindahl's theory says there is a balancing act to consider before deciding how much tax each pays. If B pays a bigger share, A would not have to cut back on his spending as much; which means he pays less tax. This is the first step in figuring out how to fairly split the tax burden between people.

- Prioritising spending on public services

The second decision Lindahl emphasises involves prioritising public spending itself. It is not just about how much people pay, but also how that money gets allocated. Suppose, there is a fixed budget for public services. If the government decides to spend more on national defence, there will be less money available for programmes like education and training as part of human resource development. This shows the need for the government to make tough choices about which public programmes are most important.

- Tax share, allocation, and total spending must be considered together

The final decision Lindahl talks about is the total amount of government spending. This directly affects how much people have to pay in taxes. If the government spends less, it needs less tax revenue. This means people get to keep more of their money or less curtailment of private spending. However, this decision cannot be made in isolation. It depends on the first two choices like how the tax burden is shared and how much goes to different public programmes. Because if people are not happy with how much tax they pay or how the money is spent, they might not be willing to fund a high level of public spending. In short, all three decisions viz; tax sharing, public spending allocation, and total spending amount are linked and need to be considered together.

- Costs shared based on individual demand for goods

In Lindahl's theory, the principles of the private economy are applied to the public economy. This means that the total cost of producing joint products X and Y is allocated based on the supply prices of each product and the demand for them. Joint products refer to goods or services that are produced together as a result of a single production process but have distinct demand patterns and can be allocated separately. Let us say that individual A wants good X and individual B wants good Y. If individual A wants to share only a small portion of the total production cost, then B will need to pay more to compensate. Similarly, if B contributes less, A will have to contribute more. This shows how benefits from public services, like X and Y, are shared among everyone in the community, making individual contributions dependent on each other. Lindahl's approach recognises that public goods benefit everyone collectively rather than individually.

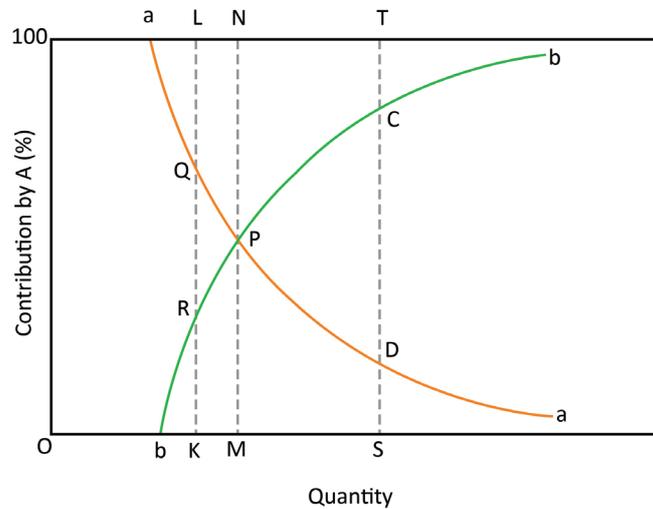


Fig: 3.3.2 Lindahl Model

The graph illustrates how the costs of providing public goods are shared between two taxpayers, A and B. Along the vertical line, we measure the percentage of total costs that A is willing to contribute, while on the horizontal axis, we measure the quantity of public goods purchased. Curve *aa* represents A's willingness to share costs, while curve *bb* shows B's willingness. The maximum amount of public goods produced is at point M, where A contributes PM percent of the total cost, and B contributes PN percent. If less is produced, say at point K, A contributes KQ percent, and B contributes LR percent, resulting in a total contribution exceeding 100%. Conversely, if more is produced, say at point S, A contributes only DS percent, and B contributes TC percent, leaving the CD portion of the total cost uncovered. This demonstrates how the willingness of each taxpayer to contribute affects the provision of public goods.

- Taxpayer's share affects public good provision

In the figure, with only two parties, A and B, the scenario resembles isolated barter or bilateral monopoly rather than a competitive market with multiple suppliers and demanders. Lindahl assumes equal bargaining power between the two taxpayers, which may not hold in reality. In a bilateral monopoly situation, the bargaining strength of each side differs, making outcomes like point P unlikely. Therefore, Lindahl's voluntary exchange theory is deemed unacceptable due to its unrealistic assumptions, particularly regarding equal bargaining power.

## Summarised Overview

The provision of public goods by the government plays a pivotal role in enhancing social well-being. Infrastructure projects such as roads and public transportation systems, along with essential services like healthcare and education, demonstrate the benefits derived from public goods. Public goods are characterised by non-excludability and non-rivalry, meaning they are available to all without exclusion, and consumption by one individual does not diminish availability to others.

The free rider problem creates market failure when it comes to the provision of public goods. Individuals may benefit from public goods without contributing to their provision, leading to under-provision in private markets. Solutions to the free rider problem include dominant assurance contracts, Coasian solutions, government provisions, subsidies, and non-individualistic approaches.

Pareto efficiency, a fundamental economic concept, seeks to maximise social welfare without harming anyone. In the context of public goods, Pareto efficiency involves balancing total social benefits with production costs. Lindahl pricing offers a framework for funding public goods, where individuals contribute voluntarily based on their willingness to pay. However, Lindahl's theory has been criticised for its unrealistic assumptions regarding equal bargaining power.

## Assignments

1. Define public goods and explain why governments often play a crucial role in providing them. Provide examples to support your explanation.
2. Describe the free rider problem associated with public goods. Provide an example and explain how it can lead to market failure.
3. What is Pareto optimality, and how does it relate to the efficient provision of public goods? Use diagram to illustrate your explanation.
4. Explain the concept of Lindahl pricing and its relevance to funding public goods. Discuss the three decisions involved in Lindahl's theory of public spending.
5. Describe the potential consequences of the free rider behaviour on the provision of a public good.

## Suggested Reading

1. Musgrave, R. A., & Musgrave, P. B. (1989). *Public finance in theory and practice* (5th ed.). McGraw-Hill.
2. Prakash, O. (2012). *Public economics: Theory and practice*. Vishal Publishing Co.

## Reference

1. Pindyck, R. S., & Rubinfeld, D. L. (2017). *Microeconomics* (8th ed.). Pearson Education.
2. Mankiw, N. G. (2020). *Principles of economics* (Eighth Edition). Cengage Learning
3. Nicholson, W., & Snyder, C. M. (2010). *Intermediate microeconomics and its application* (11th ed.). Cengage Learning.

# MASTER OF ARTS ECONOMICS



## Economics of Uncertainty

### Block 4



# UNIT 1

## Risk and Uncertainty

### Learning Outcomes

After completing this unit, learner will be able to:

- know how a person chooses in the face of risk and uncertainty
- grasp the concept of measures of risk and risk aversion
- understand the individual behaviour towards risk

### Background

If you are engaging in activities like gambling, horse racing, or purchasing insurance you cannot predict the outcome because it involves an element of uncertainty. Similarly, if you invest in assets, you would face risk because you can not guarantee a profit. After all, many market factors could lead to gains or losses. Even in everyday decisions, uncertainty plays a role, such as buying a car, television, or refrigerator, particularly during festive seasons purchasing with various discounts. You cannot be entirely sure about the quality or reliability of the products. Despite these uncertainties, we still engage in these activities and make these purchases. We can see that in many aspects of life, risk and uncertainty are inherent, and so these factors compel us to make decisions based on incomplete information. Therefore, facing risk and uncertainty is crucial in our decision-making process. Traditional economic theory assumes that consumers know exactly how much utility they gain from their consumption and therefore do not face uncertainty. This leads to simplified models where risk and uncertainty are not given much importance. However, in the real world, risk and uncertainty play a significant role in determining consumer behaviour. In this context, we explore how individuals behave when they face risk or uncertainty. Is the risk measurable? Is it possible, and how is it measured?

## Keywords

Risk, Uncertainty, Probability, Expected Utility of Money, Standard Deviation, Risk Lover, Risk Averter.

## Discussion

### 4.1.1. Risk and Uncertainty

- The outcome of a decision is uncertain but the probability of each possible outcome is known

If you are engaged in a decision-making process, you will face risk and uncertainty. 'Risk' refers to a situation where the outcome of a decision is uncertain, but the probability of each possible outcome is known or can be estimated. For instance, imagine you are investing in a particular company's stock. You know that the stock market is unpredictable, but you believe there are three possible outcomes for the company's stock over the next month: the stock price might increase, stay the same, or decrease. In this situation, the outcome of your decision, specifically whether you will make a profit or incur a loss from the shares, is uncertain. So, you face risk in your investment decision.

- Probability of occurrence of each particular outcome is not known

Uncertainty refers to the situation where there is more than one possible outcome of a decision but where the probability of occurrence of each particular outcome is not known or cannot even be estimated. Uncertainty arises in the decision-making due to the lack of information about conditions and greater instability of the variables that determine the outcome. For instance, you are an investor in an oil exploration field. Suppose your drilling location is an unproven area which means there is a lack of precise information about the likelihood of finding oil in that specific location. Geological surveys and expert opinions might offer some indication of the potential for finding oil, but they cannot guarantee certainty. Therefore even if oil is discovered, accurately predicting the quantity and quality of the reserves remains challenging for the investor. Consequently, here the investor faces uncertainty regarding both the probability of finding oil and the magnitude of success.

When making decisions that involve risk or uncertainty, the three terms are commonly used. These terms are:

1. Strategy
2. State of Nature
3. Outcome

### 1. Strategy

Strategy refers to several alternative methods or plans that can be implemented to achieve a particular goal. For example, a company manager considering certain strategies for making a higher profit. The strategies may be adopting new technologies, launching a new marketing campaign for sales promotions, redesigning the product to get greater consumer acceptance etc.

### 2.State of Nature

- Strategy, State of Nature and Outcome are influencing the decision-making

The state of nature refers to the prevailing conditions in the future that have a significant impact on the success or failure of a strategy. For instance, future economic conditions, such as booms, recessions, or normalcy, are uncertain and lie beyond the control of decision-makers. Consequently, the state of nature influences the outcomes of strategies, as it directly affects their effectiveness and ultimate success.

### 3. Outcome

Outcome denotes the result of the implementation of the strategy which is usually in the form of profit.

### 4.1.2 Measuring Risk

- Ignored technical progress, human capital, and unrealistic full employment

We observed that risk arises when there are multiple possible outcomes of a decision, and the probability of each outcome is either known or can be estimated. Therefore, the degree of risk can be measured with the help of

1. Probability Distribution
2. Standard Deviation.

#### 4.1.2.1. Probability Distribution

To assess risk, let us discuss some ideas about the probability of each possible outcome of a decision and also the role of the value of expected utility and expected value of money in decision-making under uncertainty. Probability means the

likelihood of occurring of an event. If the probability of an outcome occurring is  $\frac{1}{3}$  chance, which means there is 1 chance in 3 for the outcome to occur. Suppose you are investing in a new tech startup launching a revolutionary product. The price of the company stock rises to rupee 100 per share due to the successful launch, and falls to rupee 25 per share if the launch fails. Here, the two outcomes are a rupee 100 per share rise and a rupee 25 per share fall. If the available past information shows a  $\frac{1}{3}$  chance of the product launch being successful, and a  $\frac{2}{3}$  chance of its failure, then we can say that the probability of success of the product launch is  $\frac{1}{3}$ , and the probability of failure is  $\frac{2}{3}$ . There are two different ways of measuring probability, leading to two distinct concepts of probability. They are

1. Objective measure of probability
2. Subjective measure of probability

### 1. Objective Measure of Probability

An objective measure of probability refers to the measurement of probability based on the available past information or data. In our example, if past data indicates that there is a  $\frac{1}{3}$  chance of a product launch being successful, this suggests that the probability of success is approximately 33%.

### 2. Subjective Measure of Probability

A subjective measure of probability involves assessing probability based on personal judgments, experiences, or knowledge about the subject. In most cases, probability is subjectively determined because different individuals will make different choices, resulting in varying probabilities of the occurrence of various outcomes.

In decision-making under risk and uncertainty, individuals will make their decisions based on the expected utility of the outcome rather than the expected money value. For instance, suppose a fisherman goes out to sea to catch fish. He can sell his entire catch at a good price only under favourable weather conditions. Weather forecasting shows a 60% chance of stormy weather. If there is a storm (60% chance), the fisherman cannot sell his catch and faces a loss of Rs. 200. If the weather is calm (40% chance), the fisherman can sell his catch and earn a profit of Rs. 800. In this situation, his expected monetary value shows the average amount of money earnings per day if the above sale is repeatedly made for several days by the

- Probability is measured based on past data and personal judgements

- Sum of the values of each possible outcome times the probability of those outcomes

fisherman. That is, the expected monetary value is the sum of the values of each possible outcome times the probability of those outcomes.

$$E(V) = \text{Pr}(\text{Earning if storm}) + \text{Pr}(\text{Earning if calm})$$

Where Pr stands for probability. In our example, the fisherman's expected value is:

$$E(V) = 0.6 \times (-200) + 0.4 \times 800$$

$$E(V) = -120 + 320 = 200$$

The expected utility of the outcome represents the satisfaction or benefit derived from a particular outcome. Since utility is subjective, its values vary with different income levels. In decision-making or choices under risky and uncertain situations, the utility function depends on the individual's attitude towards risk, whether they are risk-averse, risk-loving, or risk-neutral. In our example, the expected utility of the fisherman can be calculated as follows

$$E(U) = \text{Pr}(\text{calm}) \times U(\text{Earning in case of calm}) + \text{Pr}(\text{storm}) \times U(\text{Earning in case of storm})$$

Since the probabilities of calm and stormy weather are 0.4 and 0.6, respectively, suppose the fisherman's utility for earning Rs. 800 during calm weather is 160 and the utility for Rs 200 loss during a storm is 40, then:

- Utility depends on the attitude of the individual towards risk

$$E(U) = 0.4 \times U(800) + 0.6 \times U(-200)$$

$$E(U) = 0.4 \times 160 + 0.6 \times 40$$

$$E(U) = 64 + 24 = 88$$

Thus, the expected utility of the fisherman in this situation is 88.

#### 4.1.2.2 Standard Deviation

The standard deviation measures the dispersion of possible outcomes from the expected value. When the standard deviation is low, it indicates that the outcomes are generally closer to the expected value, suggesting less variability and a more stable or predictable situation. This can also imply lower risk. On the other hand, a higher standard deviation indicates

greater dispersion, which means higher risk due to increased variability in the outcomes. The SD can be found through the following equations

$$\text{Standard Deviation} = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

Where:

$x_i$  = value of  $i^{\text{th}}$  point in the data set

$\bar{x}$  = the mean value of the data set

$n$  = the number of data points in the data set.

To find the SD of a particular probability distribution, we follow three steps.

- Dispersion of possible outcomes from the expected value

1. Subtract the expected value or the mean distribution from each possible outcome or payoff to obtain a set of deviations from the expected value.
2. Square each deviation, multiply the square deviation by the probability of its expected outcome, and then sum these products. This weighted average of squared deviation from the mean is the variance of the distribution.
3. Take the square root of the variance to find the standard deviation.

### 4.1.3 Individual Behaviour Towards Risk

- Attitude towards risk varies from person to person

The attitude towards risk varies from person to person. It is influenced by an individual's choices and the expected returns from those choices. Generally, a person expects higher returns when facing higher risks. Each decision made by an individual reflects their unique attitude towards risk, which varies among individuals. Some individuals are risk-takers, while others are risk-averse, and some are risk-neutral. Those who engage in risk-taking anticipate higher returns, profits, monetary gains, and utility.

To elucidate the individual attitude towards risk, here we consider only a single commodity which is money income. Money income represents the market basket of goods that the person can buy. It is assumed that the individual knows about the probability of making money income in different

- Outcomes are measured in terms of utility rather than money

situations. The individual preference towards risk depends on whether the individual's marginal utility of money diminishes, increases, or remains constant as their income or wealth increases. Based on individual attitudes toward risk, they can be divided into three, they are :

1. Risk Averter or Risk Averse
2. Risk Lover
3. Risk Neutral

#### 4.1.3.1 Risk Averter

Risk aversion is the most common attitude towards risk. Most people do not buy any type of insurance like life insurance, health insurance, car insurance, etc. but they seek relatively stable income-provided jobs. So we can say that a risk averter is a person who seeks to minimise risk. Let us explain the risk averter attitude towards risk with the help of the figure.

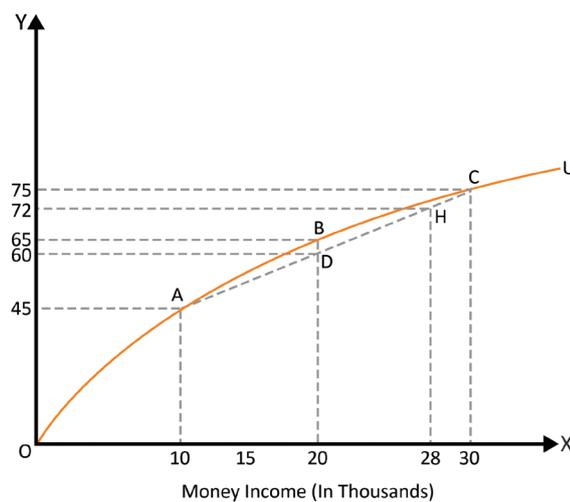


Fig 4.1.1. Utility Function of a Risk Averter

The X-axis represents money income, while the Y-axis represents the utility of money. The OU curve illustrates the utility function of an individual's money income. The slope of the OU curve indicates that the total utility of money income decreases as individual income increases. When the individual's money income rises from 10 to 20, their utility increases from 45 to 65, a gain of 20 utils, and their total utility increases from point A to point B. However, when their income increases from 20 to 28, their utility only rises from 65 to 72, an increase of 7 utils, which is smaller than the previous gain. This is depicted by the BH segment on the total

- Marginal utility of money falls as income increases

utility curve. Subsequently, as their money income increases from 28 to 30, their utility increases from 72 to 75, an increase of around 3 units only. This diagram illustrates that for risk-averse individuals, the marginal utility of money decreases as their income rises.

Suppose you are a risk-averse individual. Currently, you are employed on a fixed monthly salary basis of Rs. 20,000. In this job, you do not face any kind of risk or uncertainty because your present job provides a fixed salary. The expected utility of Rs. 20,000 is 60 utils. Now, imagine you are getting another job as a salesman on a commission basis. If you prove to be a good salesman, your income will increase to Rs. 30,000 per month. However, if you do not perform well, your income will decrease by Rs. 10,000. In this scenario, you face risk and uncertainty in your job. Due to this uncertainty, you do not know the actual utility, so you take action based on the expected utility. In our example, there is a 50-50 chance of earning either Rs. 30,000 or Rs. 10,000. If you prove to be a successful salesman, you will earn Rs. 30,000, resulting in a utility of 75. However, if you fail as a successful salesman, your income will fall by Rs. 10,000, and the utility will decrease to nearly 45. Here the expected utility of a new job is given by

$$\begin{aligned} E(U) &= 0.5 \times U(10000) + 0.5 \times U(30000) \\ &= 0.5 \times 45 + 0.5 \times 75 \\ &= 22.5 + 37.5 = 60.0 \end{aligned}$$

- Risk averter will take the riskier option when the expected value is higher

Thus, the present job, which provides a fixed salary of Rs. 20,000 with a utility of 65 and no uncertainty, is preferable. The expected utility of the new job is 60, and it also faces uncertainty. Therefore, we can see that the expected utility of the new job is less than the utility of the present job with a certain income. Consequently, the risk-averse individual will reject the new job. If the expected utility is greater than the actual utility, the risk-avertter will choose the riskier option. This is the most common attitude toward the risk.

#### 4.1.3.2 Risk Neutral

If a risk-neutral individual is indifferent between a certain given income and an uncertain income with the same expected value, they are considered risk-neutral. In the case of a risk-neutral, the marginal utility of money income remains constant

- The actual and expected utility of money income is the same

with the increase in wealth or income. Let us explain the risk-neutral attitude towards risk with the help of a figure.

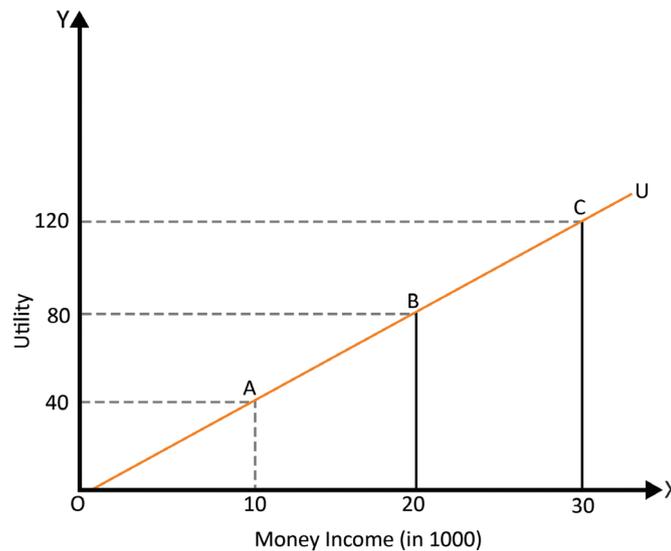


Fig 4.1.2 Utility Function of Risk-Neutral

The X-axis represents money income, and the Y-axis represents utility. The OU curve shows the total utility curve of a person. In our example, the person receives a fixed salary of Rs. 20,000 in his present job, with a utility of 80. Now, he has entered into a new risky job where he could earn Rs. 30,000 if he proves to be a successful salesman, obtaining 120 units of utility. On the other hand, if he fails to be a successful salesman, his income falls to Rs. 10,000, and he obtains only 40 units of utility. We know that there is an equal probability of obtaining either a high or low income in the new risky job. Here, we consider the expected value of the new income and the expected utility of the new job. The expected value of income is

$$0.5 (10,000) + 0.5 (30,000) = 20000.$$

Then the expected utility of new income is

$$E ( U ) = 0.5 \times U ( 10,000 ) + 0.5 \times U ( 30,000 )$$

$$= 0.5 ( 40 ) + 0.5 ( 120 )$$

$$= 20 + 60 = 80.$$

- Indifferent attitude of the risk-neutral person toward risk

It shows that the expected utility of an uncertain income is equal to the utility of an assured income. This implies that risk attitude of the risk-neutral person is indifferent between the two.

### 4.1.3.3 Risk Lover or Risk Seeker

The risk lover, or risk seeker ,prefers a risky job with the same expected income over a certain income. In the case of risk-loving individuals, their marginal utility of money increases as their money income increases. Let us explain the risk lover's attitude towards risk with the help of a figure.

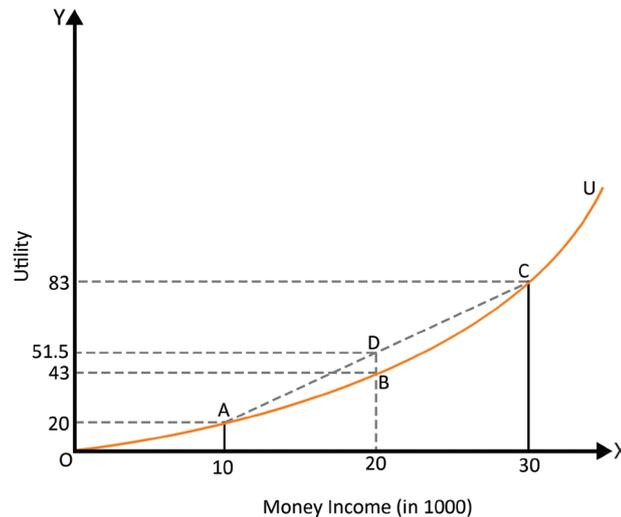


Fig 4.1.3 Utility Function of A Risk Lover or Risk Seeker

The X-axis shows the money income, and Y axis shows the utility. OU represents the utility function curve of a risk seeker. The risk-seeking individual earns 20,000 rupees from his current job and gets 43 units of utility. Suppose he joins a risky job. If he proves to be a successful salesman, he will receive a salary of 30,000 rupees and earn 83 units of utility from this salary. However, if he does not succeed as a good salesman, his salary will fall to 10,000 rupees, and his utility will drop to 20 units. Given a 50-50 chance for each outcome, the expected utility from the risky job can be calculated as:

$$E ( U ) = 0.5 \times U ( 10,000 ) + 0.5 \times U ( 30,000 )$$

$$\begin{aligned}
&= 0.5 \times 20 + 0.5 \times 83 \\
&= 10 + 41.5 \\
&= 51.5
\end{aligned}$$

- Risk seekers take risks in any situation at any cost

The expected utility from the risky job is 51.5 units, which is greater than the 43 units from the current job. Therefore, a risk-seeking individual would prefer the new job. While most individuals are risk-averse, some people believe that their expected utility will be higher, so they indulge in gambling, buy lotteries, or engage in criminal activities, even when the consequences include severe punishment.

#### 4.1.4 Risk Aversion

Risk and uncertainty are involved in decision-making. Some individuals are willing to take on risk, while others try to reduce the risk or uncertainty they face. To reduce risk, we can adopt three methods. These methods include

1. Diversification
2. Insurance
3. Gathering more information

##### 4.1.4.1 Diversification

One of the major ways of reducing risk is diversification. Diversification refers to spreading the risk, which means investing in a variety of financial assets instead of putting all your money into a single asset or investment. Imagine you decide to invest all your money in buying houses in one city. While this could make you money if property prices go up, it is also risky. If something bad happens in that city, like an economic downturn or a natural disaster, the value of your houses could drop, and you could lose a lot of money. To make your investment safer, you can practice diversification. This means spreading your money across different types of investments and locations. For example, instead of buying only houses in one city, you could invest in some properties in different cities, buy some stocks in various industries like technology and healthcare, and purchase some government bonds. This way, if one investment does not do well, others might still make money, reducing the overall risk to your savings. Diversification can significantly reduce risk if you invest in multiple assets or operate across various sectors.

- Invest in multiple resources

However, it cannot completely eliminate risk because systemic risks, those inherent to the entire market or economy, are non-diversifiable and must be borne.

#### 4.1.4.2 Insurance

- Legal agreement between an insurer ( company ) and an insured ( individual )

Another risk-reducing measure is called insurance. Insurance is a legal agreement between an insurer (company) and an insured,( individual) where the insured receives financial protection from the insurer for losses suffered under specific circumstances. Under the insurance policy, an individual pays a risk premium which represents the maximum price that an individual is willing to forgo . If the cost of an insurance policy is about the same as the risk premium they would otherwise be willing to pay for security, they will likely buy the insurance. This purchase assures them a guaranteed outcome, which helps them avoid financial risk. For instance, if your house is worth 20 lakh rupees, and there is a 0.01 chance of it getting burnt down, the expected loss from a fire would be  $1/100 \times 20,00,000 = 20,000$ . If a fire insurance policy is offered to the homeowner for 20,000 rupees, they will definitely buy it.

- Risk premium is protected from risk

The amount you pay for insurance coverage is called the insurance premium. If a fire insurance policy is offered at a price equal to the expected loss (20,000 rupees), it is considered ‘fairly priced’ because it matches the expected cost of the loss. Risk-averse individuals generally prefer certainty so they are willing to pay a premium to avoid risks. The risk premium is the extra amount someone is willing to pay beyond the expected loss to ensure they are protected from risk. Generally, individuals buy insurance from insurance companies. These companies operate based on the law of large numbers, which allows them to manage risk and earn a profit. The law of large numbers states that, as the number of events increases, the actual results will converge towards the expected outcomes. Insurance companies use this principle to insure against various risks while still making a profit. For example, consider a car insurance company that insures thousands of drivers. While each driver faces a risk of being in a car accident, the law of large numbers allows the insurance company to estimate the expected number of accidents in a given period. By knowing this, the company can set premiums at a level that ensures it can cover the claims and still make a profit.

### 4.1.4.3 Gathering More Information

- Gathering information reduces the risk

When an individual makes decisions under uncertainty, they can reduce risk by obtaining more information. Gathering more information can lead to a higher expected value and expected utility. For example, if you are buying a car or a refrigerator, you might seek information about the product's quality by asking friends for their opinions, reading reviews in newspapers, or watching product reviews on television. This approach helps you understand which option is best reducing the possibility of making a wrong decision when faced with uncertainty.

### Summarised Overview

Risk and uncertainty are the two sides of decision-making. 'Risk' refers to a situation where the outcome of a decision is uncertain, but the probability of each possible outcome is known or can be estimated, while uncertainty refers to the situation where there is more than one possible outcome of a decision but where the probability of occurrence of each particular outcome is not known or cannot even be estimated. When you engage in decision-making, you consider the possibilities of various outcomes that are either known or can be estimated. Therefore, the degree of risk can be measured. Risk can be measured with the help of probability distribution and standard deviation. Most individuals are risk-averse, so they use various methods to reduce risk, such as diversification, insurance, and gathering more information. Some individuals, unlike risk-averse people, are more inclined to take risks; they are called risk lovers. Meanwhile, others take a neutral position when facing risk and uncertainty. All these attitudes toward risk are influenced by the expected marginal utility of money.

### Assignments

1. Define the concepts of risk and uncertainty in the context of decision-making. Explain the difference between them and provide an example for each from a business or financial scenario.
2. Explain the three common strategies for reducing risk: diversification, insurance, and gathering more information. For each strategy, provide a real-world example to illustrate how it can be used to mitigate risk.
3. Risk-neutral and risk-loving individuals have different attitudes towards uncertainty. Discuss these attitudes with examples. Create a scenario where a risk-neutral person must choose between a certain outcome and a risky

alternative with the same expected value.

4. Discuss how expected utility differs from expected monetary value in decision-making. Provide a scenario in which an individual might choose a lower expected monetary value for a higher expected utility. Explain why this might occur and what it reveals about individual preferences towards risk and uncertainty.

## Suggested Reading

1. Mankiw, Gregory. N (2012), *Principles of Microeconomics*, 6th Edn, CengageLearning
2. Krugman, Paul & Wells, Robin (2005), *Micro Economics*, Worth Publishers, NewYork

## Reference

1. Salvatore, Dominick (2009), *Principles of Microeconomics*
2. Pindyck, Robert.S, Rubinfeld, Daniel, L, Mehta, Premlal, L (6th edition), *Micro Economics*



## UNIT 2

# Risk and Insurance

### Learning Outcomes

After completing this unit, learner will be able to:

- grasp the knowledge of the economics of insurance
- get an idea of risk pooling
- understand the concept of risk-spreading

### Background

We know that risk is a potential loss due to uncertainty. Risk is inherent in many situations, from driving a car to investing in the stock market. Risk can be reduced through insurance, which is one of the most common and effective ways to manage risk. Insurance involves a contractual arrangement between individuals who pay a premium and a company that provides coverage against specific risks. This transfer of risk offers safety to the individuals in case of adverse events. Insurance covers a wide range of risks, from health and life insurance to auto and home insurance. When a particular event occurs, policyholders file claims to receive compensation from the insurance company. Typically, only a small portion of policyholders make claims at any given time. However, when multiple claims are made due to a major event or crisis, the insurance company may face a risky situation. The question then arises: how do insurance companies manage during critical times, and what strategies do they use to maintain stability? To understand this, in this unit, we can explore the history of the economics of insurance and examine how insurance companies navigate critical stages when facing a large number of claims or significant financial pressure.

### Keywords

Economics of Insurance, Risk Shifting, Risk Pooling

## Discussion

### 4.2.1 Economics of Insurance

- The concept of insurance economics emerged after the 1970s

Early economic models generally used deterministic approaches, that is the models did not account for randomness or uncertainty in economic phenomena, even though risk has always been always a part of economic activity. Before 1960, there was an incomplete analysis of insurance markets or the behavior of individuals in these markets in the economic literature. This scarcity indicates that while the risk was recognised, there was only a limited formal exploration into how insurance operates as a risk management mechanism or how people interact with insurance products. In the 1970s, six key papers laid the foundation for the development of the economic theory of insurance. These papers were authored by Borch (1962), Arrow (1963), Mossin (1968), Akerlof (1970), Ehrlich and Becker (1972), and Joskow (1973). All of them were based on the “expected utility paradigm.” This concept is central to economics and decision theory, and suggests that individuals make choices based on the expected utility (or value) of different outcomes. In the context of insurance, this implies that people evaluate risks and choose insurance coverage to maximise their expected utility.

- Risk shifting is beneficial to both parties

Kenneth Arrow and Karl Borch were early pioneers in developing the economic analysis of insurance and related concepts. They mainly focused on the modern understanding of insurance economics, risk, and uncertainty. Kenneth Arrow explained how various institutional arrangements could help shift risk among parties. Arrow’s framework suggested that these institutions shift risk to parties, this way they earn a comparative advantage. When a risk-averse party is willing to pay a fixed price (an insurance premium) to an insurer by entering into an insurance contract. The risk-averse party receive protection against certain risks. Meanwhile the insurer reduces its financial risk by spreading it across many different policies and policyholders. In this way, both parties receive benefits from the insurance arrangement. Kenneth Arrow identified three primary reasons that limit risk shifting: moral hazard, adverse selection, and transaction costs. He suggested that coinsurance could be a solution to these issues. Coinsurance refers to a situation where the insured and the insurer share the risk, with each party covering a portion of any loss or claim.

- Optimal insurance condition in the risk exchange

In this field, another major contribution was made by Karl Borch in 1962, when he significantly advanced the theory of optimal insurance. He developed the necessary and sufficient conditions for achieving Pareto optimality in risk-pooling arrangements. Pareto optimality refers to a state where no individual can be made better off without making someone else worse off. Borch's concept of Pareto-optimal risk exchange suggests that the sharing of social risks should be based on the risk tolerance of each participant. Those with a higher tolerance for risk (which corresponds to lower risk aversion) will bear a larger portion of the social risk. Borch's work also showed how risk aversion influences the optimal amount of coverage or the ideal share each participant should hold in a risk pool. His approach to risk exchange had a notable impact on the development of principal-agent models, which examine relationships between a principal (such as an insurer) and an agent (like an insured party).

#### 4.2.2 Risk Pooling and Risk Spreading

Risk pooling is a risk management strategy employed by insurance companies. It involves the practice of spreading risk across a group of policyholders or companies. By sharing risk among a larger pool, companies can mitigate their risk, ultimately reducing the impact of potential losses.

- Financial burden can be mitigated through risk pooling

For instance, Imagine a town with around 1,000 car owners, all of whom have insurance with the same insurance company. Each car owner pays an annual premium of ₹1,000, meaning the insurance company collects a total of ₹10,00,000 (1,000 cars × ₹1,000 each) into a risk pool. Over a year, most car owners do not make claims. However, during the monsoon season, 50 car owners in the town suffer car damage due to flooding. The cost to repair or replace these cars varies for each individual, with some claims being higher than others. To simplify, let's say the average claim is ₹10,000. Therefore, if all 50 car owners file claims, the total payout by the insurance company would be about ₹5,00,000 (50 claims × ₹10,000 each). Since the insurance company collected ₹10,00,000 in premiums, it can cover these claims and still have ₹5,00,000 left over to cover administrative costs, and profits, or to reserve for future claims. In this example, by pooling risks among 1,000 car owners, the insurance company can handle the financial impact of 50 claims without difficulty. This risk-pooling approach ensures that even if you personally have an accident or suffer flood damage, you are not responsible

for the full financial burden of your loss. Instead, the risk is distributed across the entire group of policyholders. When a company follows the principle of risk pooling, it helps share the financial burden of potential risks among many individuals or entities. This allows each person or company to contribute a small portion of their resources to cover potential risks, making insurance more affordable for everyone involved.

- Risk pooling helps to share the financial burden and ensure diversification of the pool

Additionally, diversification of risk involves distributing risk across different types of events, geographical areas, or individuals with varying levels of risk exposure. This diversification helps reduce the overall volatility and uncertainty associated with individual risks. Suppose in property insurance, the risk pool includes a mix of properties located in different regions, each with unique risks, such as earthquake-prone areas and those at lower risk of such events. The pool could also contain a variety of properties, such as residential homes, commercial buildings, and industrial facilities, each with different risk profiles. By diversifying the pool, insurers can mitigate the impact of catastrophic events. If a natural disaster like a hurricane or earthquake affects one part of the pool, the loss can be balanced by other areas where the risk is lower. This diversification allows insurers to manage their exposure to significant losses more effectively.

- Spreads its risk diversification

Risk spreading is used by the company to manage risk. In the case of risk pooling, the company puts all its eggs in one basket, while in risk spreading, it does not concentrate risk in a single place. Instead, the company spreads its risk across a large number of policyholders through diversification. Diversification means that the company provides insurance for various things, not only health insurance but also accidents, fire, car insurance, and more. By adopting a risk-spreading method, the company can help reduce the level of risk.

## Summarised Overview

The traditional theory of consumer behavior largely ignores the factors of uncertainty and risk, assuming that consumers have perfect knowledge of the future, thereby leading to certainty. However, in real life, we encounter risk and uncertainty in many areas. After 1960, major theories emerged focusing on risk and uncertainty. Among the most significant contributions were those of Kenneth Arrow and Karl Borch. Kenneth Arrow suggested that risk shifting is beneficial to both companies and individuals, while Karl Borch focused on optimal insurance conditions for risk exchange. Next, let us explore how insurance companies manage their risk when large claims are raised by policyholders. They often use two methods: risk pooling and risk spreading. Risk pooling involves sharing risk among a larger group, allowing companies to mitigate the impact of potential losses by distributing the financial burden. This approach helps companies remain financially stable even when multiple claims are made. On the other hand, risk spreading involves diversifying risks across a wide range of policyholders and different types of insurance. By spreading risk, companies can reduce the potential impact of large claims or adverse events. Both risk pooling and risk spreading are effective strategies for reducing the risk burden on insurance companies.

## Assignments

1. Discuss the contributions of Kenneth Arrow and Karl Borch to the economic analysis of insurance. Explain how their theories on risk shifting and optimal insurance conditions have influenced modern insurance practices.
2. What are the main reasons that limit risk shifting, as identified by Arrow? How does coinsurance address these limitations?
3. Define the concepts of risk pooling and risk spreading in the context of insurance. Describe the key differences between these two strategies.
4. Provide an example (other than the car insurance example) that illustrates how risk pooling can help mitigate financial risks for insurance companies and policyholders.

## Suggested Reading

1. Mankiw, Gregory. N (2012), *Principles of Microeconomics*, 6th Edn, Cengage Learning
2. Krugman, Paul & Wells, Robin (2005), *Micro Economics*, Worth Publishers, New York

## Reference

1. Salvatore, Dominick (2009), *Principles of Microeconomics*
2. Pindyck, Robert.S, Rubinfeld, Daniel, L, Mehta, Premlal, L (6th edition), *Micro Economics*
3. Varian H.R (2010), *Intermediate Micro Economics: A Modern Approach*, East– West Press Edition 10. Snyder, Christopher & Nicholson, Walter (2012), *Microeconomic Theory-Basic Principles and Extensions*, Cengage learning



## UNIT 3

# Asymmetric Information

### Learning Outcomes

After completing this unit, learner will be able to:

- understand the concepts of the economics of search
- grasp the knowledge of imperfect asymmetric information
- get an idea of uncertainty and the market for lemons
- familiarise the Akerlofs concept

### Background

When you decide to purchase a product, search for a job, or invest in financial assets, you will gather information on quality, price, substitute products, past performance, and safety from various sources like friends, online reviews, or advertisements. For these processes, you spend time and money, which will reduce the risk and uncertainty. But sometimes this effort does not always guarantee accurate results as the markets are uncertain. Consider that you are buying a used car. The seller typically knows much more about the car's condition than you. Despite your research, there may still be hidden issues. This lack of information can lead to unexpected costs and lower-than-expected utility. As a result, distrust can grow, ultimately causing market failure. This happens because of information asymmetry. The imbalance of information can lead to an overabundance of low-quality products, This, in turn, can cause market failure, stunting economic growth. In this unit, we will explore the implications of asymmetric information, search costs, and markets for lemon, examining their impact on market efficiency and explore potential solutions to mitigate these issues.

## Keywords

Search Cost, Search Goods, Experience Goods, Uncertainty, Asymmetric Information, Lemon Problem, Adverse Selection

## Discussion

### 4.3.1 Economics of Search

- Consumers are spending time, effort, and money on better products

In today's market, consumers have many choices when buying products and services. With so many options, it can be challenging to find reliable information and the lowest prices for the product. For finding these, the consumer is spending time, effort, and money. This process is known as the "economics of search." Understanding search costs is important for both consumers and businesses, as it affects shopping habits, price variations, and competition in the market.

- Seeking information about the product

Search costs refer to the time, effort, and resources (including money) used by consumers when seeking information about a product or service before making a purchase. These costs can include the time spent reading advertisements, making phone calls, traveling to stores, inspecting products, and comparing prices at different retailers to find the best deal. For example, if you are a buyer, you would be seeking information about the price, quality, and substitute products. The time you spend and the effort you make to gather this information are included in the search costs. The most important component of search cost is time, time spent learning about the attributes of products, and sometimes the money spent by the consumer for purchasing to aid them in their search.

- Price dispersion occurs due to the lack of perfect information

One of the most important components when buying a product is time. A significant amount of time can be spent shopping across different sellers or stores to find the lowest price. Even when the product is identical and other sales conditions are the same, such as location convenience, service quality, credit options and return policy, the prices of the same product can vary between different sellers. This variation in prices is known as price dispersion. Price dispersion occurs because consumers do not have perfect information about where to find the lowest price. Gathering information to find the lowest price can be time-consuming and costly, as consumers must

visit or research multiple stores or websites to compare prices. Additionally, people value time differently. Some may be willing to spend a lot of time searching for the best deal, while others prefer convenience and are willing to pay a little more to save time.

- Search continues until  $MB = MC$

Consumers should continue searching for the lowest price as long as the marginal benefit exceeds the marginal cost, and until the benefit is equal to the cost. Marginal benefit refers to the gain from finding a lower price product through additional searching. The benefit depends on how much the price drops with each additional search, and the quantity of the product they are buying at that price. Marginal cost refers to the cost of spending more time and effort on searching. The cost of searching depends on how much consumers value their time, assuming they do not enjoy shopping itself. Since everyone values their time differently, some consumers are willing to spend more time searching for lower prices, while others are not. This is why different consumers may end up buying the same product at different prices. Those who have lower opportunity costs for their time will likely search more and pay lower prices, while those with higher opportunity costs might pay more for convenience.

- Stop searching when the  $MB = MC$

Even for homogenised products, prices can vary in the market at any time. A consumer can accept the price offered by the first seller they visit, or they can keep searching for a lower price. Unless the consumer knows that the first seller's price is the lowest, they should keep searching as long as the benefit of finding a lower price product is greater than the cost of additional searching. Generally, the benefit of searching decreases when you spend the more time looking for lower prices. Even if the cost of additional searches stays constant, there comes a point where the benefit of finding a lower price product equals the cost of the extra search. When that happens, the consumer should stop searching.

- Advertising provides useful details about the product

Consumers get information about products through advertising, which provides useful details such as how to use the product, its price, the manufacturer and retail outlets. Although advertising can sometimes manipulate consumers, it can also reduce price dispersion and lower average prices. Additionally, advertising can increase competition among firms, which can further lower product prices while still providing valuable information to consumers.

- Sellers and buyers get benefits from the advertising

In his 1974 paper “Advertising as Information,” published in the *Journal of Political Economy*, Philip Nelson discusses the role of advertising. He divides goods into two categories: search goods and experience goods. Search goods are those whose quality can be evaluated at the time of purchase through inspection. Examples of search goods are fresh fruits, vegetables, apparel, and greeting cards. In contrast, experienced goods cannot be judged at the time of purchase; their quality can only be evaluated after using them. Examples of experience goods include automobiles, computers, TV sets, etc. Some goods are borderline, like books, which can be partially evaluated by inspecting them at a bookstore before purchasing, but their full quality is only understood after reading. In the case of search goods, advertisements contain a lot of information, so any attempt by the seller to misrepresent the product would be easily detected by the buyer. However, the situation is different for experience goods, where the seller knows the true properties of the product before the buyer uses it, potentially leading the buyer to make a wrong decision. Nevertheless, an established seller is willing to spend a large amount of money on advertising because it helps support the seller’s claims, and they gain satisfaction from repeat purchases by satisfied customers.

- Government intervention in the market when the search costs are high

Sometimes the cost of gathering information is very high, or the use of a product is dangerous. In such cases, the government intervenes in the market by providing information such as gas mileage for automobiles, or by regulating the use of products, such as prescription drugs. The spread of information is now growing by leaps and bounds due to the phenomenal growth of the internet. Sometimes, sellers announce the lowest possible price at which they will sell a product, without bargaining, to eliminate the need for consumers to search for the lowest price.

### 4.3.2 Market with Imperfect Asymmetric Information

- Akerlof was the first to discuss information asymmetry

The concept of asymmetric information is associated with three economists: George Akerlof, Michael Spence, and Joseph Stiglitz. In 2001, they were awarded the Nobel Prize in Economics for their work on this theory. Akerlof was the first to discuss information asymmetry in his 1970 paper, ‘The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism.’ Spence added to the discussion in 1973 with his

paper, 'Job Market Signaling.' Stiglitz played a significant role in bringing the concept of information asymmetry into mainstream acceptance.

- Imbalance of information between two parties

Asymmetric information refers to an imbalance of information between two parties engaged in economic activity. It occurs when one party has more information than the other. In real life, there are various examples of asymmetric information. For instance, in the second-hand market, sellers often know much more about the quality of the product than buyers. In the labour market, workers generally have more information about their skills and abilities than employers. This information gap can lead to market inefficiency or market failure because the parties involved cannot derive mutual benefits from the trade.

- Asymmetric information raises the principal-agent problem in the labour market

Here, we consider the asymmetric information in the labour market. Labour market face unemployment even though the workers are actively searching for jobs, why? This situation can be explained through efficiency wage theory. Asymmetric information occurs when one party in a transaction knows more than the other. In the labour market, firms have imperfect information about their workers' productivity and performance. They cannot continuously monitor every worker to ensure they are being productive. Because of this asymmetric information, workers tend to shirk or slack off, knowing that their employer might not notice or cannot easily verify their level of productivity. This uncertainty creates a principal-agent problem. The principal-agent problem refers to workers (agents) who might not act in the best interests of their employer (principal).

- Efficiency wage is the solution to asymmetric information in the labor market

Asymmetric information in the labor market can be addressed through efficiency wages. The efficiency wage model states that a worker's productivity can depend on the wage they receive. The model assumes that in a perfectly competitive labor market, all workers earn the same wage, such type of wage is called the market-clearing wage. If a firm pays only the market-clearing wage, workers can quickly find another job at the same wage, and it also reduces the work efficiency of workers. This model suggests that a firm should offer an "efficiency wage," to create a strong incentive for workers to maintain productivity and avoid shirking. An efficiency wage refers to a wage that is higher than the market-clearing wage, However, offering efficient wages can lead to some degree of unemployment, as higher wage rates may result in fewer job openings. Despite this trade-off, efficiency wages are

considered an effective strategy for addressing the challenge of asymmetric information in the labor market.

- Market signaling can prevent asymmetric information

The effects of asymmetric information can be mitigated through the implementation of market signaling. The concept of market signaling was first developed by Michael Spence. He explained that market signaling is the process by which sellers send signals to buyers, conveying information about product quality. Suppose a firm hires new workers but doesn't know their working capacity. The workers, however, have much more information about themselves—they know how hard they tend to work, how responsible they are, what their skills are, and so on. The firm will learn about its workers only after they have been on the job for some time, but because of legal restrictions, it cannot dismiss them after hiring. If the firm considers providing additional training to improve productivity, it might be cost-prohibitive. In this context, Spence suggests that firms can adopt market signaling to gather information about workers' productivity. A good example of a strong signal for productivity is education. Education helps identify high-productivity people, as it reflects certain attributes like intelligence, motivation, discipline and energy. Even if education did not directly improve productivity, it would still serve as a useful signal because more productive individuals tend to succeed in educational settings. Thus, firms are justified in considering education as a signal of productivity.

- Effective screening reduces the impact of asymmetric information

Joseph Stiglitz suggests that the method of screening can help reduce the effect of asymmetric information. He defines screening as a way to identify characteristics that distinguish individuals based on their productivity. This process allows employers to separate high-productivity employees from low-productivity ones. Screening helps one party (often employers or buyers) gain more accurate knowledge about another party's (such as employees or sellers') characteristics, skills, or quality. In the labour market, firms hire new workers after using some screening methods, such as tests, interviews or background checks, which can reveal information that is not immediately observable. This helps employers understand the skills, experience, and reliability of job candidates.

### 4.3.3 Uncertainty and the Market for Lemons

Suppose you have a car worth 20 lakhs, and it has driven nearly 100 km. Afterward, you decide to sell the car. How

- Uncertainty reduces the value of second-hand product

much should you expect to get for the car? Probably not less than 16 lakhs of rupees. Here arises the question: why does the value of second-hand cars reduce so much? The answer is the asymmetric information about the quality of the car due to uncertainty. The seller of the car has more knowledge about the quality of the used car rather than the buyer. Furthermore, the buyer thinks about the car's quality and asks himself: why is this car for sale? Is there something wrong with it? Is this car good or bad? etc. George Akerlofs was the first to analyse the implication of asymmetric information about product quality in his paper "The Market For Lemon: Quality, Uncertainty, and Market Mechanism" published in 1970. Let us discuss the implication of asymmetric information in the market for used cars.

### 4.3.3.1 The Market for Used Cars

- Low-quality cars can drive high-quality cars out of the market

Suppose two kinds of cars are available in the used car market or second-hand car market. They are high-quality cars and low-quality cars. The low-quality car is known as a lemon. Due to the asymmetric information, low-quality cars can drive high-quality cars out of the market, this situation refers to the lemon problem. Let us explain the lemon problem in the used cars market with the help of figures.

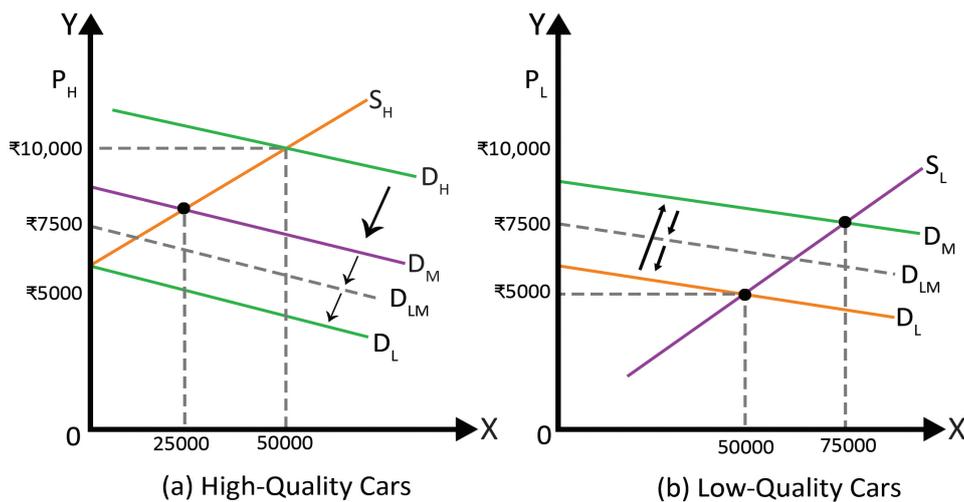


Fig 4.3.1 Lemon Problem due to the Asymmetric Information

- Sellers expect to receive higher prices, and buyers are willing to pay more for higher-quality cars

In the above two figures, part ‘a’ represents the high quality car market and part ‘b’ represents the low quality car market. In part, a DH shows the demand for high-quality cars while the SH shows the supply of high-quality cars. Similarly in part ‘b’, the SL and DL show the demand and supply of low-quality cars. In the figure, the supply curve for high-quality cars (SH) is to the left of the supply curve for low-quality cars (SL) at any given price level. This is because owners of high-quality cars are expected to receive a higher price for their products. Consequently, they hesitate to sell at a lower price. Similarly, the demand curve for high-quality cars (DH) is higher than the demand curve for low-quality cars (DL), indicating that buyers are willing to pay a higher amount for high-quality cars. The figure shows that the market price for high-quality cars is ₹ 10,000, while the market price for low-quality cars is ₹5,000, with ₹ 50,000 cars of each type being sold.

- Demand for used cars is influenced by the perception of their quality

In this situation, the sellers know much more about the quality of used cars than the buyers, creating uncertainty. The buyers can only find out the actual condition of the car after purchasing and driving it for a while. Initially, the buyers might think there is a 50-50 chance of getting a high-quality or low-quality car because when both sellers and buyers know the quality, 50,000 cars of each type are sold. As a result, buyers view all used cars as being of “medium quality.” In the figure, the demand for used cars is influenced by the perception of their quality. The demand for medium-quality cars, denoted by DM, lies above the demand for low-quality cars (DL) but below the demand for high-quality cars (DH). These medium-quality cars sell for about ₹ 7,500 each. However, this change in perception leads to the demand for low-quality cars being higher, with around 75,000 units of low-quality cars being sold, (PART B) while the demand for high-quality cars is lower, with only 25,000 units of high-quality cars being sold, (part a) which is significantly lower than the demand for low-quality cars.

- Change in the perceptions leads to maintaining only low-quality cars in the market

As consumers begin to understand, that about 3/4 of the cars being sold are low quality, their expectations about the market change. This is shown in the new demand curve, DLM, indicating that people now think most cars are of low to medium quality. As a result, the perceived demand curve shifts further to the left from DM to DL, reflecting the drop in demand for high-quality cars from 50,000 to 25,000, while the demand for low-quality cars rises from 50,000 to 75,000.

This process continues until only low-quality cars are being sold. At this point, the market price for cars is so low that it discourages the sale of high-quality cars. Consequently, consumers assume that any car they buy will be low-quality, making DL the only relevant demand curve.

- Asymmetric information leads to the lemon problem

This situation represents an extreme case of market imbalance. The market might reach equilibrium at a price that attracts at least some high-quality cars, but the share of high-quality cars in the market would still be smaller than that of low-quality cars. This is because buyers cannot easily determine the quality of a car before purchasing, leading to a situation where low-quality cars drive high-quality cars out of the market. This phenomenon is known as the lemons problem.

#### 4.3.4 Akerlof's Analysis

- Imbalance of information between buyers and sellers

George Akerlof first introduced the concept of asymmetric information in his paper titled 'The Market for Lemons: Quality Uncertainty and the Market Mechanism,' published in 1970. He developed the concept of asymmetric information within the context of the automobile market. Akerlof argued that buyers receive some static information about the market. Based on this information, they evaluate the value of goods. Here buyers receive only average information about the market, while sellers possess more specific information about the product. Such type of imbalance of knowledge between buyers and sellers leads to asymmetric information problems. Akerlof states that in many markets where asymmetric information prevails, sellers are encouraged to sell goods of lower quality than the market average. This can lead to a decrease in the overall quality of goods available in the market and subsequently reduce the size of the market itself.

In his model of the automobile industry, George Akerlof considers four types of cars: new cars and old cars. Both types can be either good or bad, with bad cars commonly known as lemons. He states that sellers have more information than buyers regarding the true value of cars in the second-hand industry. Akerlof explains that the price of a new car is greater than that of a lemon car. However, in the second-hand car market, the price of both good cars and lemons is the same because buyers cannot differentiate between the two. Therefore, cars sell at an average price. If buyers purchase lemon cars, it would be beneficial to the sellers, even if they are of premium quality. Conversely, if buyers purchase good

- Asymmetric information creates an adverse selection in second-hand industries

cars, it would disadvantage the sellers. The result of lower prices for all used cars, discouraging sellers of high-quality cars. They withdraw their products from the market, leading to good cars being out of the market, while bad cars dominate. This creates an adverse selection problem in the second-hand car market.

- Counteracting institutions can mitigate the effect of asymmetric information

George Akerlof suggests that asymmetric information can be mitigated by intermediary market institutions known as counteracting institutions, such as guarantees for goods. A guarantee provides the buyer with time to assess the product's quality before assuming full risk. Similarly, brand names, chains, and franchising offer buyers assurance of quality while also enabling sellers of above-average goods to receive fair value. Consequently, these mechanisms prevent the market from collapsing entirely, ensuring its continuation and improved functionality.

## Summarised Overview

In this unit, we explored the role of search costs in reducing risk and uncertainty when consumers seek information about products. This search process often requires time and money, yet it may not always yield accurate or complete results, leading to asymmetric information. Asymmetric information arises when one party in a transaction has more or better information than the other, creating an imbalance that can disadvantage the less-informed party. A classic example is the used car market, where sellers typically know more about a vehicle's condition than buyers. This information asymmetry can cause mistrust and even lead to market failure. A notable consequence of asymmetric information is the "lemon problem," where low-quality goods ("lemons") can drive high-quality goods out of the market. This concept, introduced by economist George Akerlof in his seminal paper, "The Market for 'Lemons'," highlights the broader implications of information gaps and their potential to undermine market efficiency. Asymmetric information can also raise the principal-agent problem in the labor market. This problem occurs when the agent (such as an employee) has more information about their actions or performance than the principal (like an employer). This imbalance can lead to inefficiencies in the workplace. However, there are several methods to address this issue, including efficiency wages which means that Paying above-market wages to incentivize employees to perform better and reduce shirking. The second solution is market signaling which provides signals of productivity or quality, like educational degrees or certifications, to demonstrate a worker's abilities to potential employers also effective screening refers to the employer's use of various techniques to assess the quality of job applicants, reducing the uncertainty in hiring decisions.

## Assignments

1. Define “asymmetric information” and explain its impact on economic transactions. Provide an example from a real-world scenario that illustrates the concept of asymmetric information
2. Discuss the concept of search costs in the context of consumer markets. How do search costs influence consumer behaviour? What are some factors that contribute to higher search costs, and what can consumers do to mitigate them?
3. Explain the “lemon problem” as introduced by George Akerlof. How does asymmetric information in the used car market lead to the Lemon problem? What is the impact on market efficiency and consumer trust?
4. Examine the principal-agent problem in the labour market. How does asymmetric information contribute to this problem? Describe at least two strategies employers use to address asymmetric information and improve hiring decisions

## Suggested Reading

1. Mankiw, Gregory. N (2012), *Principles of Microeconomics*, 6<sup>th</sup> Edn, Cengage Learning
2. Krugman, Paul & Wells, Robin (2005), *Micro Economics*, Worth Publishers, New York

## Reference

1. Salvatore, Dominick (2009), *Principles of Microeconomics*
2. Pindyck, Robert.S, Rubinfeld, Daniel, L, Mehta, Premlal, L (6<sup>th</sup> edition), *Micro Economics*
3. Varian H.R (2010), *Intermediate Micro Economics: A Modern Approach*, East– West Press Edition 10. Snyder, Christopher & Nicholson, Walter (2012), *Microeconomic Theory-Basic Principles and Extensions*, Cengage learning



## UNIT 4

# Moral Hazards - The Principal - Agent Problems

### Learning Outcomes

After completing this unit, learner will be able to:

- explain how the asymmetric information leads to moral hazards and the principal-agent problem
- understand the concept of moral hazard
- grasp the concept of the principal-agent problem

### Background

We know that asymmetric information can significantly impact market efficiency, especially in a business setting. Suppose you run a firm. As an employer, you may face uncertainty when evaluating new candidates because you have only limited knowledge about their skills, experience, and work ethic. This lack of information can lead to hiring mistakes, which can negatively affect your firm's performance. To address this, it is crucial to implement a critical hiring process. Conduct thorough background checks, hold detailed interviews, and use skill assessments to better understand a candidate's capabilities and alignment with your company's culture and goals. These steps can help reduce the risk of hiring individuals who may not align with your business's objectives. Even after hiring new employees, monitoring their actions and ensuring they act in the company's best interest can be challenging. If you do not monitor your employees properly, a number of issues might occur, impacting the day-to-day activities of the company. Lack of oversight could lead to reduced productivity, increased errors, misuse of company resources, or even unethical behavior. In this unit, we will discuss these types of issues and explore ways to address them.

### Keywords

Asymmetric information, Moral hazards, Principal-Agent Problem

## Discussion

### 4.4.1 Moral Hazard

- Highly informed person taking advantage of a less informed person

Asymmetric information can lead to moral hazards. Moral hazards occur when a party whose actions are unobserved can affect the probability or magnitude of a payment associated with an event. This happens when an informed person takes advantage of a less informed person, often through an unobserved action. Let us consider an example from the insurance market. After purchasing insurance for my home against theft, I may become less vigilant about its security. For instance, when leaving the house, I might neglect to lock doors or install an alarm system. This behaviour increases the likelihood of theft. Such changes in behaviours after obtaining insurance raise the problem of moral hazards. Moral hazards are not only a problem in the insurance market; other markets also face this issue. For example, a doctor may prescribe unnecessary tests for a patient to earn higher wages provided by the hospital management. Another example is an employee spending more time on mobile phones during working hours when his or her boss is not monitoring. In our examples, the insurance company, patient, and the company owner bear a large disadvantage compared to the others due to the moral hazards.

- Moral hazards affect the market efficiency

Moral hazard is altering the ability of markets to allocate resources efficiently. Suppose when you drive a car, there is always a risk of accidents or damages. If you take insurance, which could help cover those costs if something goes wrong and now imagine that the insurance company monitoring how much you drive. They could adjust your insurance costs based on how often you use your car. When you drive more, you pay a higher insurance bill. Here, keep in mind that insurance cost is a part of driving expenses. If insurance costs are a part of overall driving expenses, people are more careful because they know that driving more will increase their insurance bills. Here, people take responsible driving because they do not want to pay more for insurance. Here, there is no problem of moral hazard. So here the marginal cost of driving and marginal benefits of driving are equal; therefore, there is no market inefficiency. But if the insurance company is not properly monitoring you, they cannot adjust your costs accordingly, so here the moral hazards occur. People take more reckless driving, they think that any accidents will be covered by

insurance without much impact on their costs. So, they drive more than they should, and that is not good for anyone. So, the marginal cost of driving is less than the marginal benefit of driving, and the result will be market inefficiency. Let us explain with the help of a diagram

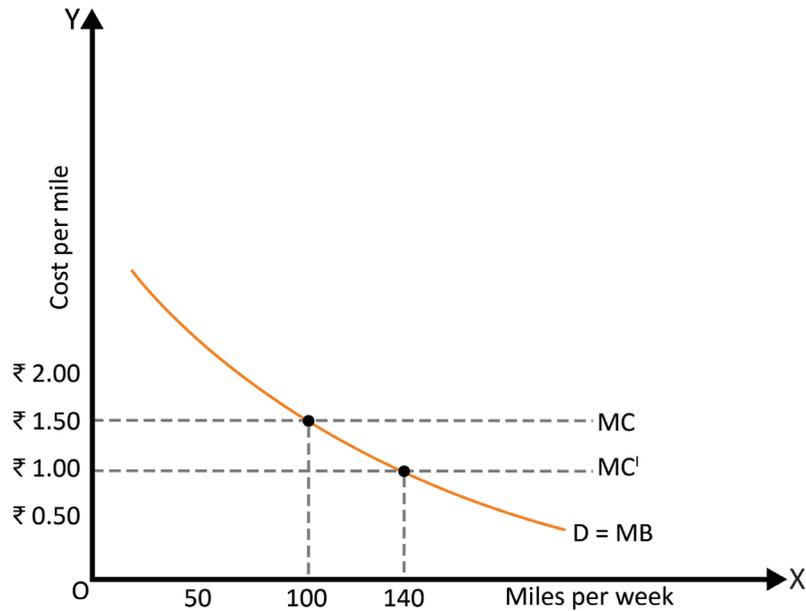


Fig 4.4.1 Effects of Moral Hazards

The X-axis represents the miles per week of driving, and the Y-axis represents the cost per mile of driving. The downward-sloping demand curve shows the marginal benefits of driving. The reason for the downward slope is that as the cost of driving increases, people search for alternative transportation. The MC curve denotes the marginal cost of driving. In our example, your insurance cost is ₹50. When you drive 100 miles per week, your cost will be ₹1.50. In the diagram, this situation represents market efficiency because here the MC is equal to MB, and there are no issues of moral hazards. However, due to the lack of proper monitoring by the insurance company, moral hazard occurs. People drive more per week at a lower cost, as shown in the diagram where the driver drives 140 miles per week at ₹1.00. Here, the MC is less than the MB, resulting in market inefficiency.

#### 4.4.2 The Principal - Agent problems

The principal-agent problem arises when agents pursue their own goals rather than the goals of principals. The agent is an

- Agents pursue their own goals rather than the goals of the principal

individual appointed by the principal to achieve the principal's objectives. The principal is the individual who owns one or more agents to achieve their objective. The principal-agent problem arises as a result of asymmetric information between the principal and the agent. Let us consider a firm as an example. The principal in this case is the owner of the firm, while the agents are the workers or managers. The principal-agent relationship involves one party's welfare depending on the actions of another. For instance, the owner relies on the managers to run the day-to-day operations effectively, ensuring high efficiency in the firm. However, owners typically cannot monitor everything that the agents do. This leads to an information imbalance, where employees or agents know more about the firm's internal workings conditions than the owners. As a result, agents might act in their own interest rather than in the best interests of the principals and also neglect the firm's overall goals. When this happens, a conflict can arise between the principal and the agents, potentially leading to inefficiency and other negative outcomes. This principal-agent problem can affect market efficiency by causing misaligned incentives and reducing the optimal allocation of resources within the firm.

- Lack of information- managers act in their own way resulting in principal-agent problem

Let us examine how the principal-agent problem occurs in the stock market. In the share market, shareholders are the principals and they own the company. They are investing money and expect more profits. As owners, they have a vested interest in the company's success but typically do not manage day-to-day operations. On the other hand, managers are the agents. Managers are hired to use their expertise to meet the company's objectives and further the interests of the shareholders and, by extension, the company. They make decisions about strategy, operations, hiring, and other critical functions. Due to the lack of consistent monitoring, managers may act in their interests rather than in the interests of the shareholders or the broader organisation. This result will be a conflict between the shareholders (principals) and managers (agents). This conflict between them is known as the principal-agent problem. This misalignment can affect the company's day-to-day activities, leading to inefficiencies and other problems.

The principle agent problem can be solved through the aim of aligning the interests of the agent with those of the principal. This can be achieved by providing the right incentives or

- Solution to the principal-agent problem is the right incentive or monitoring mechanisms

implementing monitoring mechanisms to ensure that agents act in the best interest of the principals. These incentives can be financial (such as performance-based bonuses) or non-financial (like career advancement opportunities). Monitoring measures might include regular audits, performance evaluations, or governance structures that ensure transparency and accountability. By doing so, firms can reduce conflicts and improve overall efficiency.

## Summarised Overview

Asymmetric information is a fundamental concept in economics it describes a situation where one party in a transaction has more or better information than the other. This information imbalance can lead to various issues, including moral hazards and principal-agent problems, which can ultimately disrupt market efficiency. Moral hazards occur when an individual or group takes advantage of a less informed party by altering their behavior in a way that increases risk, often because they do not bear the full consequences of their actions. This can happen in several situations such as insurance and healthcare. Similarly, the principal-agent problem emerges when an agent, responsible for acting on behalf of a principal, has incentives to pursue their interests rather than those of the principal, often due to lack of oversight or proper incentives. This misalignment of incentives can lead to inefficiency and reduced productivity within organisations and markets.

## Assignments

1. Define moral hazards. Give three examples of how moral hazards can arise in real-world situations.
2. Describe a specific industry or market where moral hazards have caused significant inefficiencies, explaining the underlying reasons.
3. Define the principal-agent problem and explain how it relates to asymmetric information. Suggest at least two methods used to mitigate this problem?
4. Identify and discuss three strategies that firms or other organisations can implement to reduce moral hazards and align the interests of agents with those of principals.

## Suggested Reading

1. Mankiw, Gregory. N (2012), *Principles of Microeconomics*, 6th Edn, Cengage Learning
2. Krugman, Paul & Wells, Robin (2005), *Micro Economics*, Worth Publishers, NewYork

## Reference

1. Salvatore, Dominick (2009), *Principles of Microeconomics*
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3. Varian H.R (2010), *Intermediate Micro Economics: A Modern Approach*, East– West Press Edition 10. Snyder, Christopher & Nicholson, Walter (2012), *Microeconomic Theory-Basic Principles and Extensions*, Cengage learning

സർവ്വകലാശാലാഗീതം

വിദ്യായാൽ സ്വതന്ത്രരാകണം  
വിശ്വപൗരരായി മാറണം  
ഗ്രഹപ്രസാദമായ് വിളങ്ങണം  
ഗുരുപ്രകാശമേ നയിക്കണേ

കൂരിരുട്ടിൽ നിന്നു ഞങ്ങളെ  
സൂര്യവീഥിയിൽ തെളിക്കണം  
സ്നേഹദീപ്തിയായ് വിളങ്ങണം  
നീതിവൈജയന്തി പറണം

ശാസ്ത്രവ്യാപ്തിയെന്നുമേകണം  
ജാതിഭേദമാകെ മാറണം  
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ജ്ഞാനകേന്ദ്രമേ ജ്വലിക്കണേ

കുരിപ്പുഴ ശ്രീകുമാർ

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# MICROECONOMICS II

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