

07. Engel's Law of family expenditure and significance. - Consumer's surplus– estimation and applications.

Engel's Law on Family Expenditure

Every family has to spend money on necessities of life, education, health, clothing, house rent, light and fuel, recreation and so on. A list containing expenditure by a family on each of these items is called 'Family Budget'. Earnest Engel (1857) made an investigation on family budgets. For that purpose, he studied three groups of people viz., poor, middle and rich. From his study, he derived the following conclusions, which are known as 'Engel's Law on Family Expenditure'.

- 1) As the family income increases, the percentage of income spent on food decreases, although the actual amount increases.
- 2) The percentage expenditure on clothing, house rent, light and fuel remains the same for any income level.
- 3) The percentage expenditure on education, health and recreation increases with every increase in the income of the family.

i) Implications of Engel's law

- 1) The poor class people may find it difficult to spend on health, education and recreation facilities, as they have to spend large amount on food and other necessities.
- 2) As the poor class has to spend more on food, any rise in the price or tax levied on food would affect the poor more than the rich.

Table 3.3 Consumption Pattern in Different Sizes of Households
(Amount in Rs / Month)

Particulars	Small		Middle		Large	
	Amount	Percentage	Amount	Percentage	Amount	Percentage
Food	792	66	1392	58	1800	50
Clothing & House rent	120	10	240	10	360	10
Fuel and lighting	96	8	192	8	288	8
Education	12	1	72	3	180	5
Medical	36	3	120	5	252	7

Recreation	12	1	48	2	144	4
Social & Religious functions	36	3	96	4	180	5
Services	36	3	96	4	180	5
Others	60	5	144	6	216	6
Total	1200	100	2400	100	3600	100

ii) Importance of Family Budget

1) Family budget studies help us to find out the consumption pattern of people in different countries.

2) We are able to understand the trends in the cost of living of people.

3) The government can design its policies on prices, subsidies and taxes of various commodities considering the standard of living of people in the country.

iii) Cross Elasticity of Demand

The cross elasticity of demand may be defined as the ratio of proportionate change in the quantity demanded of commodity X to a given proportionate change in the price of the related commodity Y.

$$\text{Cross Elasticity of Demand } E_c = \frac{\text{Percentage Change in Quantity Demanded of X}}{\text{Percentage Change In Price of Y}}$$

$$E_c = \frac{\frac{\Delta Q_x}{Q_x} \times 100}{\frac{\Delta P_y}{P_y} \times 100} = \frac{\Delta Q_x}{Q_x} \times \frac{P_y}{\Delta P_y} = \frac{\Delta Q_x}{\Delta P_y} \times \frac{P_y}{Q_x}$$

Where, Q_x = Quantity demanded of commodity X; P_y = Price of Y.

If the price of coffee rises from Rs 4.50 to Rs 5 per hundred grams and as a result, the consumer's demand for tea increases from 60 hundred grams to 70 hundred grams, the cross elasticity of demand can be estimated as follows:

$$E_T = \frac{10}{1.50} \times \frac{450}{3} = 1.50$$

It could be concluded that the quantity demanded of a commodity (tea) increases by 1.5 per cent, if the price of its substitute (coffee) rises by one per cent. Therefore, the cross elasticity of demand between the two substitute goods is positive, that is, in response to the rise in price of one good, the demand for the other good rises. Substitute goods are also known as competing goods. On the other hand, when the two goods are complementary with each other, as in the case of bread and butter, the rise in price of one good brings about the decrease in demand for the other. Therefore, the cross elasticity of demand between the

two complementary goods is negative. For example, if the price of bread rises from Rs 6 to Rs. 7 per loaf, the quantity demanded of butter decreases from 3 kgs to 2 kgs per month. The cross elasticity of demand for butter is:

$$E_{\text{Butter}} = \frac{\Delta Q_{\text{Butter}}}{\Delta P_{\text{Bread}}} \times \frac{P_{\text{Bread}}}{Q_{\text{Butter}}} = \frac{-1}{1} \times \frac{6}{3} = -2$$

It could be concluded that the demand for butter decreases by two per cent for one per cent rise in the price of bread.

C. CONSUMER'S SURPLUS

The concept of consumer's surplus is important in economic policies such as taxation by the government and price policy pursued by the monopolist seller of a product. The essence of the concept of consumer surplus is that a consumer derives extra (or surplus) satisfaction from the purchases he daily makes than the price he actually pays for them. This extra satisfaction, which the consumer obtains from buying a good, has been called consumer's surplus by Marshall. Thus, Marshall defines the consumer's surplus in the following words: “ **Excess of the price which a consumer would be willing to pay rather than go without a thing over that which he actually does pay, is the economic measure of surplus satisfaction.**”

The amount of money which a person is prepared to pay for a good indicates the amount of utility he derives from that good; the greater the amount of money he is willing to pay, the greater the satisfaction or utility he will obtain from it. Therefore, the marginal utility of a unit of a good determines the price a consumer will be prepared to pay for that unit. The total utility which a person will get from a good will be given by the sum of marginal utilities (Σ MU) of the units of goods purchased, and the total price which he will actually pay is equal to the price per unit multiplied by the number of units purchased. Thus:

$$\begin{aligned} \text{Consumer's surplus} &= \text{What a consumer is prepared to pay} \text{ minus } \text{What he actually pays} \\ &= \text{Sum of marginal utility} - (\text{Price} \times \text{No. of units purchased}) \end{aligned}$$

a) Measurement of Consumer's Surplus

The concept of consumer's surplus is derived from the law of diminishing marginal utility. The consumer attains equilibrium position when he purchases the number of units of a commodity at which marginal utility is equal to the price. This means that at the margin what a consumer will be prepared to pay (i.e., marginal utility) is equal to the price he actually pays. But for the previous

units, which he purchases, the marginal utility he gets were greater than the price he actually pays for them.

Table 3.4 Consumer's surplus

Units	Total Utility	Marginal Utility	Price(Rs/Unit)	Consumer's surplus
1	20	20	10	20-10 = 10
2	38	18	10	18-10 = 8
3	54	16	10	16-10 = 6
4	68	14	10	14-10 = 4
5	80	12	10	12-10 = 2
6	90	10	10	10-10 = 0
7	98	8	10	-

Rs. 30

This is because the price is constant. In the table 3.4, the consumer is in equilibrium if he purchases 6 units of the commodity at which the marginal utility and price of the commodity are same. Then, the consumer's surplus is, Rs.30 i.e., the difference between what he actually pays and what he is prepared to pay, is equal to (90-60) = 30.

Thus, Consumer's Surplus = Total Utility – $\left\{ \begin{array}{l} \text{Number of Units of a} \\ \text{Commodity Purchased} \end{array} \times \begin{array}{l} \text{Price of the} \\ \text{Commodity} \end{array} \right\}$

In the figure 3.13, total utility of OM units is equal to ODSM. But given the price OP, the consumer will actually pay for OM units of the good the sum equal to OPSM. It is thus, clear that the consumer derives extra satisfaction (utility) equal to (ODSM minus OPSM) DPS, which has been shaded in the figure.

b) Importance of Consumer's Surplus

1) Distinction between value- in-use and value-in-exchange: Value-in-use of a commodity signifies the utility or satisfaction it provides to the consumer, while

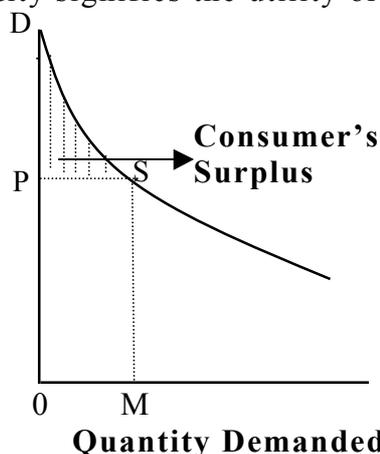


Fig.3.13 Consumer's Surplus

value-in-exchange means the price paid by the consumer for the commodity. A commodity like salt has more utility but has only a small exchangeable value. In such cases, consumer's surplus will be more. A commodity like diamond has only a limited utility but has a great exchange value. In this case, the consumer's surplus will be less. Thus, the concept of consumer's surplus is used to distinguish

between value-in use and value in-exchange.

2) Helpful to monopolist in price fixation: Monopolist fixes price of a commodity in such a way that it bears at least a part of consumer's surplus. However, he cannot absorb the whole of the surplus, as there may be opposition from the consumers.

3) Helpful to policy makers: The policy makers can impose tax, if the consumer's surplus for a commodity is very high. Similarly, subsidy can be granted, if the consumer's surplus is low.

Chapter 3: Questions for Review:

1. Fill up the blanks

- When price of a commodity increases, its quantity demanded _____.
- The three kinds of demand are _____, _____ and _____.
- When price of a commodity is constant, an increase in income results in _____.
- The demand for common salt is _____.
- As the demand for tea increases, it results in increase in demand for sugar. Therefore, the demand for tea and sugar is called _____.
- The concept of consumer's surplus will be useful to _____ the price.
- The consumer is at equilibrium when he purchases six mangoes at the rate of Rs.2 per unit and the total utility is 20. Then, he derives _____ worth of consumer's surplus.

2. Give examples to the following:

- Joint demand
- Elastic demand
- Substitutes
- Inelastic demand
- Derived demand
- Composite demand
- Complementary goods
- Inferior goods
- Giffen goods

3. Differentiate the following:

- Price demand and Income demand
- Direct demand and Derived demand
- Extension of demand and Increase in demand
- Substitution effect and income effect
- Perfectly elastic demand and Perfectly inelastic demand
- Inferior good and Giffen good
- Arc elasticity and Point elasticity

4. Write short notes

- Cross demand
- Law of demand
- Demand schedule
- Consumer's surplus

- e) Income elasticity of demand
- f) Cross elasticity of demand
- g) Engel's law on family expenditure
- h) Elasticity by Total Expenditure Method

5. Answer the following:

- a) Write briefly about the price elasticity of demand.
- b) Describe the factors affecting demand.
- c) Explain in detail how the law of demand is derived?
- d) Write in short the exceptional demand curve.
- e) Describe in detail the measurement of elasticity of demand.
- f) Explain the different types of price elasticity of demand.
- g) Explain the factors influencing price elasticity of demand.
- h) What are the uses of elasticity of demand?
- i) Explain the different types of income elasticity of demand.
- j) What are the implications of Engel's Law on Family Expenditure?
- k) How the study of family budget will be useful to policy makers?
- l) Briefly write on the importance of consumer's surplus.