Mathematical Treatment of Consumer Equilibrium – Explained!

Article shared by Pragati Ghosh

We begin with the simple model of a single commodity 'X'. The utility function of the consumer may be written as

U = f(q„)

Where utility is measured in monetary units. If the consumer purchases q_x units of the commodity, his expenditure is p_x q_x for p_x price of this commodity.

Since the consumer seeks to maximise the difference between his utility and expenditure ($U - p_x q_x$), so the necessary condition for equilibrium requires to make partial derivative of the function with respect to q_x equal to zero. We have

$$\frac{\partial U}{\partial q_x} - \frac{\partial (p_x q_x)}{\partial q_x} = 0$$

Or, $$\frac{\partial U}{\partial q_x} = p_x$$

Or, $$MU_x = p_x$$

Thus, the consumer is in equilibrium, when the marginal utility of commodity 'X' is equal to the price of this commodity. To derive equilibrium condition for a consumer consuming 'n' commodities, we first obtain the result in case of two goods X, and X_2 only. Let $U = f(x_1, x_2)$ be the utility function. Further, the consumer has a fixed income or budget 'M'. He spends the entire budget and purchases x, and x_2 units of the commodity. The budget equation is

$^{M} = P_1 {}^{x}{}_1 {}^{+} P_2 {}^{X}{}_2$

Since utility (U) is to be maximised, subject to budget constraint (M), the net utility of the consumer will be

N = Utility as given in the utility function – Loss of utility on account of money spent to purchase the two goods

= Utility – (Marginal Utility of Money x Expenditure)

$= U - \lambda M$

$= f(x_1, x_2) - X (p_1 x_1 + p_2 x_2)$ … (4.3)

The first condition for utility maximisation

$$\frac{\partial N}{\partial x_1} = \frac{\partial N}{\partial x_2} = 0$$

Therefore, we have

$$\frac{\partial f}{\partial x_1} - \lambda p_1 = 0$$

$$\frac{\partial f}{\partial x_2} - \lambda p_2 = 0$$

The above two equations can also be obtained by equating first partial derivative of the Langrangian expression

$N = f_1(x_1, x_2) + \lambda (M - p_1 x_1 - p_2 x_2)$ to zero (Langrange Multiplier Technique).

From equations (5.4) and (5.5), we get

$$\frac{MU_1}{p_1} = \frac{MU_2}{p_2} = 1 \qquad \left[\frac{\partial f}{\partial x_1} = \frac{\partial U}{\partial x_1} = MU_1 \text{ and } \frac{\partial f}{\partial x_2} = MU_2\right]$$

The second order (sufficiency) condition is given by the law of diminishing marginal utility. The second order condition is satisfied, so long as the marginal utility curves for both goods are downward sloping. Symbolically,

$$\frac{\partial^2 f}{\partial x_1^2} < O \text{ and } \frac{\partial^2 f}{\partial x_2^2} < O$$

Taken across all goods, this gives the general version of the law of equimarginal utility. This law states that the consumer equalizes the ratio of marginal utilities with the ratio of corresponding prices for each pair of goods consumed. Thus, we have

$$\frac{MU_1}{p_1} = \frac{MU_2}{p_2} = \frac{MU_3}{p_3} = \ldots = \frac{MU_n}{p_n} = \lambda$$

'λ' represents the common ratio of marginal utility of money or the marginal utility of income or the gain in total utility from the expenditure of a marginal unit of money. When a consumer consumes many commodities, expenditure on a single commodity represents only a small part of his total expenditure. Any ordinary change in its p

a small change in the purchasing power.

Home ››

Related Essays:

1. What are the Two Different Types of Consumer Surplus? – Explained!
2. Useful Notes on Consumer's Equilibrium
3. What do you mean by Consumer's Equilibrium in Economic Sense?
4. What is the Law of Equi Marginal Utility? (Consumer Equilibrium)
5. 2 Important Conditions that must be satisfied for Consumer Equilibrium
6. Useful Notes on Consumer's Equilibrium in Both One and Two Commodity World

Short Essay on Woman

SHARE YOUR ESSAYS
A WEB PLATFORM TO SHARE YOUR ESSAYS

Welcome to Shareyouressays.com! Our mission is to provide an online platform to help students to discuss anything and everything about Essay. This website includes study notes, research papers, essays, articles and other allied information submitted by visitors like YOU.

Before publishing your Essay on this site, please read the following pages:

1. Content Guidelines
2. Privacy Policy
3. TOS
4. Disclaimer Copyright

Publish Your Essay

Short Essay on Woman

Read Next Story ›