# What is the Law of Equi Marginal Utility? (Consumer Equilibrium)

Article shared by Pragati Ghosh

A consumer spends his income on many goods and services. Now, the question is, how he should distribute his total income among these goods and services, so that he may be in equilibrium. That is, he attains the maximum possible level of utility.

Here, it should be pointed out that the consumer is assumed to be a rational person, judicially and carefully calculating the utilities of various goods and substituting them for one another to maximise utility. Further, marginal utility of money is assumed to be constant.

We analyse the equilibrium of the consumer by taking the case of two goods, ‘A’ and ‘B’. The same analysis can be extended for any number of goods. Let the prices of ‘A’ and ‘B’ are $P_A$ and $P_B$ respectively.

Then from the law of diminishing marginal utility, it can be deduced that the consumer is in equilibrium, when the quantity of the commodity is purchased in such a way that MU derived from it is equal to the price paid for it multiplied by the marginal utility of money to the consumer. That is

$MU_A = \alpha P_A$ …(4.1)

and $MU_B = \alpha P_B$ …(4.2)



Where a (pronounced as alpha) is the marginal utility of money to the consumer.

Dividing the first equation by the second,

$MU_A / MU_B = P_A/P_B$

That is, if the price of good 'A' is twice tha
has to be twice $MU_B$. To be in equilibrium, the ratios of the prices of the two commodities and their respective quantities of MU should be equal. In other words, marginal utilities of all the commodities should be proportional to their respective prices. The consumer adjusts the quantities purchased of both the commodities to achieve this result, so that he is in equilibrium.



From equation (4.1)

$\alpha = MU_A / P_A$

And from equation (5.2)

$\alpha = MU_B / P_B$

Which implies $\alpha = MU_A/P_A = MU_B/P_B$

Thus, the equilibrium condition can also be stated as: The consumer is in equilibrium, when the marginal utility of money to the consumer (a) is equal to the ratios of the marginal utilities of the two commodities and their respective prices. Further, individual marginal utilities should be declining.

Now, if $MU_A / P_A$ is greater than $MU_B / P_$
substitute good 'A' for good 'B'. As a resu
quantity of 'A' and decrease in the quanti
and $MU_B$ will go up.

The consumer will continue the substituti becomes equal to $MU_B / P_B$, when he will be in equilibrium. Equality of $MU_A / P_A$ and $MU_A / P_A$ is the same thing as saying that the 1st rupee spent on 'A' yields the same utility as the last rupee spent on 'B'. The same explanation can be extended for any number of commodities.

The consumer spends his money income in such a way that the last rupee spent on each commodity gives him equal amount of utility. But, this does not mean spending of equal amount of money on each commodity. This only means that marginal utilities of commodities and their respective prices are proportional. The law of equi-marginal utility is generalised as follows:

$MU_A / P_A = MU_B / P_B = MU_C / P_C = \ldots\ldots\ldots = \alpha$

The law of equimarginal utility can be explained with the help of an example. In the table given below, marginal utilities of two goods 'A' and 'B' are shown:

Table 4.4: Marginal Utilities of Goods 'A' and 'B'

| Quantity | $MU_A$ (in utils) | $MU_B$ (in utils) |
|---|---|---|
| 1 | 21 | 18 |
| 2 | 18 | 16 |
| 3 | 15 | 14 |
| 4 | 12 | 12 |
| 5 | 9 | 8 |
| 6 | 6 | 6 |
| 7 | 3 | 2 |

Let us suppose that prices of goods 'A' and 'B' are Rs. 3 and Rs. 2 respectively. Now, we construct a new table by dividing the marginal utilities of 'X' by 3 and marginal utilities of 'Y' by 2.

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Table 4.5: Marginal Utilities of Each Rupee Spen
Units of Goods 'A' and 'B'

| Quantity | $\frac{MU_A}{P_A}$ | $\frac{MU_B}{P_B}$ |
|---|---|---|
| 1 | 7(3) | 9(1) |
| 2 | 6(4) | 8(2) |
| 3 | 5(5) | 7(3) |
| 4 | 4(6) | 6(3) |
| 5 | 3(7) | 4(6) |
| 6 | 2(8) | 3(7) |
| 7 | 1(9) | 1(9) |

Suppose, the consumer has an income of Rs. 14 to spend on goods 'A' and 'B' and let his marginal utility of money be 6 utils, i.e., 1 Rs. = 6 utils. The consumer will be in equilibrium while buying 2 units of 'A' and 4 units of 'B'. From the table, we can see that at this combination of 'A' and 'B'; $MU_A / P_A = MU_B / P_A = \alpha = 6$ (Here a denotes the marginal utility of money). By buying 2 units of 'A' and 4 units of 'B\ the consumer is spending whole of his income (2 x 3 + 4 x 2 = Rs. 14) on the two commodities.

Now, assume that the money income of the consumer rises to Rs. 27 resulting in the fall of marginal utility of money to him to 3 utils, the prices of goods 'A' and 'B' remaining unchanged. Now, the consumer attains the equilibrium by buying 5 units of 'A' and 6 units of 'B'. Again from the table, we can see that at his combination of 'A' and 'B'; $MU_A/P_A = MU_B/ P_B = a = 3$. By buying 5 units of 'A' and 6 units of 'B', the consumer is spending whole of his income (5 x 3 + 6 x 2 = Rs. 27) on the two commodities. Consumer's equilibrium can be explained by drawing the graph of $MU_A/P_A$, $MU_B/P_B$, etc.

As MU curve slopes downward, MU/P curve slopes downward. In Fig. 4.8, let OM is the marginal utility of money, which is taken to be constant. The consumer is in equilibrium when $MU_A/P_A = MU_B/P_B = OM$, that is, when Oa quantity of 'A', and Ob quantity of 'B' is purchased. He cannot increase the utility by varying these quantities of 'A' and 'B'.

If, however, the income of the consumer
marginal utility of money will fall. After the
income, his marginal utility of money is C

equilibrium situation, he will purchase Oa
commodity 'A' and Ob quantity of the commodity 'B'.

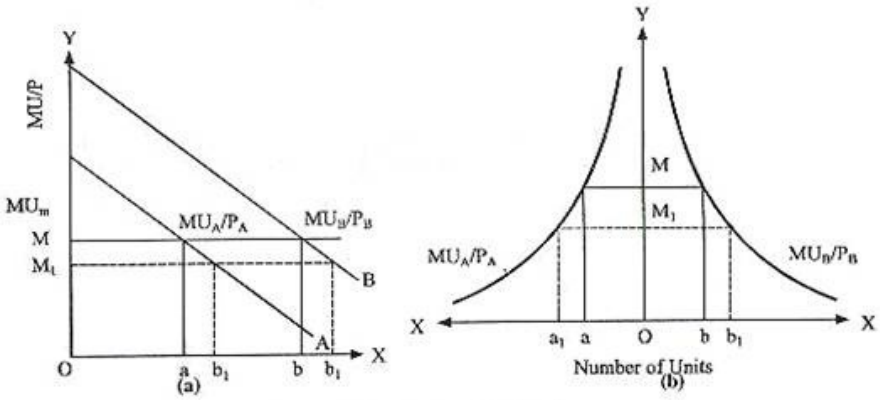


Fig. 4.8: Consumer Equilibrium

The consumer will tend to consume various units of the two commodities in decreasing order of their marginal utilities per unit rupee, subject to budget constraint $p_xq_x + p_yq_y$. The order has been shown in the brackets in Table 4.5.

There is another way also to explain the law of equimarginal utility. In Fig. 4.9, $00_1$ is the total income which is to be spent between two goods 'A' and 'B'. Marginal utility of rupees spent on 'A' is taken on OY-axis and on 'B' is taken on O, Y, – axis. Thus, $MU_A$ is the marginal utility curve for 'A' and $MU_B$ is the marginal utility curve for 'B'.

The money spent on good 'A' is taken from left to right and that spent on 'B' is taken from right to left. The two curves $MU_A$ and $MU_B$ intersect each other at point 'E'. At point 'E', the marginal utilities of both the commodities are equal, which is the condition of equilibrium.

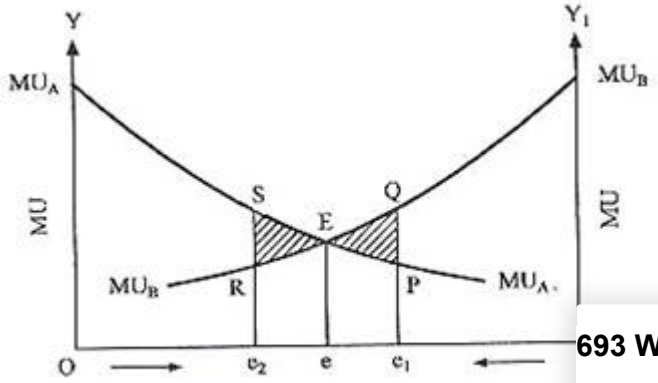


Fig. 4.9: Consumer Equilibrium (Alternative A

Thus, consumer will spend Oe money on
and remaining $O_1$,e on commodity 'B'. The marginal utilities of the last rupee spent on both the commodities are same. The consumer is getting the maximum utility from his money income.

Now, it can be shown that if consumer deviates from this combination of 'A' and 'B' the total utility will decline. For example, if he increases his spending on commodity 'A' by $ee_1$, the gain to the consumer is represented by the area below the curve $MU_A$ from 'e' to $e_($, that is, $ee_1$ PE.

But, ee, is also the money which is withdrawn from commodity 'B' resulting in the loss in utility equal to the area e, QE. It can be seen that loss in utility is more than, gain in utility. The net loss of utility to the consumer is equal to the shaded area EPQ. If, instead, expenditure on commodity 'B' is increased by reducing the expenditure on commodity 'A', the net loss of utility to the consumer will be equal to the shaded area ERS.

Thus, it is clear that consumer gets the maximum utility, when the money is distributed on various goods in such a way that marginal utility derived from the last rupee spent on all the goods is equal.

The equilibrium condition on the basis of the law of equi-marginal utility can be stated in two different ways:

(i) A consumer is in equilibrium, when the quantities of various commodities are bought in such a way that the ratios of marginal utilities of various commodities to their respective prices are same and are equal to the marginal utility of money. That is, when

$MU_A/ P_A = MU_B/ P_B = MU_m$

(ii) A consumer is in equilibrium, when the ratios of marginal utilities of two goods and their respective prices are the same. This condition is satisfied by all the pairs

$MU_A/ MU_B = P_A / P_B$ and $MU_B/ MU_C = P_B$

When a consumer is faced with equal pri
commodities that he intends to consume, the equilibrium condition gets reduced to $MU_A = MU_B = MU_C$ =……=

$MU_m$. In such a situation, he distributes his expenditure among various goods in such a manner that he derives the same marginal utility from each good. In the words of J.R. Hicks,

> *"Utility will be maximised when the marginal unit of expenditure in each direction brings in the same increment of utility".*

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