

LAW OF DIMINISHING MARGINAL UTILITY

The concept of utility can also be used to recast our analysis in a way that provides additional insight. To begin, let's distinguish between the total utility obtained by consumption and the satisfaction obtained from the last item consumed. Marginal utility (MU) measures the additional satisfaction obtained from consuming one additional unit of a good. For example, the marginal utility associated with a consumption increase from 0 to 1 unit of food might be 9; from 1 to 2, it might be 7; from 2 to 3, it might be 5. These numbers imply that the consumer has diminishing marginal utility: As more and more of a good is consumed, consuming additional amounts will yield smaller and smaller additions to utility. Imagine, for example, the consumption of television: Marginal utility might fall after the second or third hour and could become very small after the fourth or fifth hour of viewing. We can relate the concept of marginal utility to the consumer's utility-maximization problem in the following way.

The law of diminishing marginal utility explains that as a person consumes an item or a product, the satisfaction or utility that they derive from the product wanes as they consume more and more of that product. For example, an individual might buy a certain type of chocolate for a while. Soon, they may buy less and choose another type of chocolate or buy cookies instead because the satisfaction they were initially getting from the chocolate is diminishing.

In economics, the law of diminishing marginal utility states that the marginal utility of a good or service declines as its available supply increases. Economic actors devote each successive unit of the good or service towards less and less valued ends. The law of diminishing marginal utility is used to explain other economic phenomena, such as time preference.

Whenever an individual interacts with an economic good, that individual acts in a way that demonstrates the order in which they value the use of that good. Thus, the first unit that is consumed is dedicated to the individual's most valued end. The second unit is devoted to the second most valued end, and so on. In other words, the law of diminishing marginal utility postulates that when consumers go to market to purchase a commodity, they do not attach equal importance to all the commodities they buy. They will pay more for some commodities and less for others.

As another example, consider an individual on a deserted island who finds a case of bottled water that washes ashore. That person might drink the first bottle indicating that satisfying their thirst was the most important use of the water. The individual might bathe themselves with the second bottle, or they might decide to save it for later. If they save it for later, this indicates that the person values the future use of the water more than bathing today, but still less than the immediate quenching of their thirst. This is called ordinal time preference. This concept helps explain savings and investing versus current consumption and spending.

Since, there is a lot of discussion let's divide all this under simplified 6 topics namely:

- 1. What Is Diminishing Marginal Utility?**
- 2. Understanding the Law**

3. **Limitation Of the Law**
4. **Diminishing Prices**
5. **Example of Diminishing Utility**
6. **Importance Of the Law**
7. **Issues Of the Law**
8. **Application Of the Law**
9. **Conclusion**

1. What Is Diminishing Marginal Utility?

The Law Of Diminishing Marginal Utility states that all else equal as consumption increases the marginal utility derived from each additional unit declines. Marginal utility is derived as the change in utility as an additional unit is consumed. Utility is an economic term used to represent satisfaction or happiness. Marginal utility is the incremental increase in utility that results from consumption of one additional unit.

Diminishing marginal utility refers to the phenomenon that each additional unit of gain leads to an ever-smaller increase in subjective value. For example, three bites of candy are better than two bites, but the twentieth bite does not add much to the experience beyond the nineteenth (and could even make it worse). This effect is so well established that it is referred to as the “law of diminishing marginal utility” in economics, and is reflected in the concave shape of most subjective utility functions. An important consequence of diminishing marginal utility is that subjective value changes most dynamically near the zero point, and quickly levels off as gains (or losses) accumulate.

2. Understanding the Law

Marginal utility may decrease into negative utility, as it may become entirely unfavorable to consume another unit of any product. Therefore, the first unit of consumption for any product is typically highest, with every unit of consumption to follow holding less and less utility. Consumers handle the law of diminishing marginal utility by consuming numerous quantities of numerous goods.

It should be carefully noted that it is the marginal utility and not the total utility that declines with the increase in the consumption of a good. The law of diminishing marginal utility means that the total utility increases but at a decreasing rate.

Marshall who was the famous exponent of the marginal utility analysis has stated the law of diminishing marginal utility as follows:

“The additional benefit which a person derives from a given increase of his stock of a thing diminishes with every increase in the stock that he already has.”

This law is based upon two important facts. Firstly, while the total wants of a man are virtually unlimited, each single want is satiable. Therefore, as an individual consumes more and more units of goods, intensity of his want for the goods goes on falling and a point is reached where the individual no longer wants any more units of

the goods. That is, when saturation point is reached, marginal utility of goods becomes zero. Zero marginal utility of goods implies that the individual has all that he wants of the goods in question.

The second fact on which the law of diminishing marginal utility is based is that the different goods are not perfect substitutes for each other in the satisfaction of various particular wants. When an individual consumes more and more units of a goods, the intensity of particular want for the goods diminishes but if the units of that goods could be devoted to the satisfaction of other wants and yield as much satisfaction as they did initially in the satisfaction of the first want, marginal utility of the good would not have diminished.

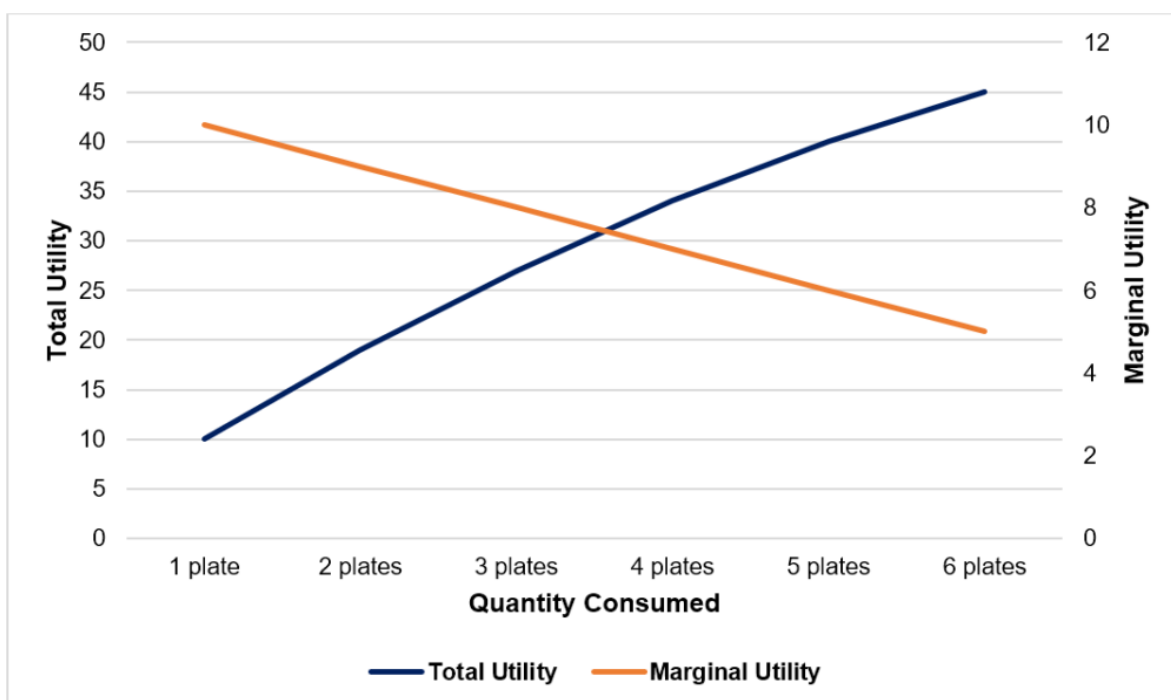
The Law of Diminishing Marginal Utility is best understood through an analogy. Consider the following example:

John is extremely hungry and goes to a restaurant that offers a buffet. He loads up his plate with food and starts eating. The amount of satisfaction gained by john from a plate of food is directly proportional to john's hunger level. Therefore, the first plate of food will give john more satisfaction (utility) than the second plate of food, which in turn will give john more satisfaction than the third plate of food.

The situation above occurs because each plate of food reduces john's hunger level. The reduction in hunger level results in less satisfaction from the plate of food being consumed. Each plate of food fills john up and thus lessens the amount of satisfaction he will get from the plates of food that follow. Mathematically, it can be represented by the following table:

Amount Of Food Consumed (Plates)	Total Utility	Marginal Utility
1	10	--
2	19	9
3	27	8
4	34	7
5	40	6
6	45	5

Graphical Representation of the Law of Diminishing Marginal Utility



Mathematical interpretation of the law of diminishing marginal utility

The law of diminishing marginal utility states the utility function is upward sloping and concave. Neoclassical microeconomics theory assumes that all commodities are infinitely divisible. This allows economists and mathematicians to assume continuous utility functions and use calculus to analyze marginal changes.

The example above implicitly makes use of the assumption of continuity. For instance, one can read off the graph that 3.5 plates of food give the consumer 35 units of utility. If we assume a continuous utility function, then the marginal utility from the x th unit of consumption is simply the slope (or derivative) of the total utility function at x units.

$$M = \frac{dTU(x)}{dx}$$

3. Limitation Of the Law

This is a universal law and holds true in the case of physiological, social or artificial wants. It is another thing that in the case of certain commodities the limit of satiety is soon reached, while others take some time.

But the law holds only under certain conditions given below:

1. Homogeneous Units:

There should be a single commodity with homogeneous units wanted by an individual consumer. All units of the commodity should be of the same

weight and quality. If, for example, the first apple is sour and the second sweet, the second will give greater satisfaction than the first.

2. No Change in Tastes:

There should be no change in the tastes, habits, customs, fashions and income of the consumer. A change in any one of them will increase rather than diminish utility.

3. Continuity:

There should be continuity in the consumption of the commodity. Units of the commodity should be consumed in succession at one particular time. Pieces of bread taken at random may increase utility.

4. Suitable Size Units:

Units of the commodity should be of a suitable size, Giving Water to a thirsty person by spoons will increase the utility of the subsequent spoons of water.

5. Constant Prices:

Prices of the different units and of the substitutes of the commodity should remain the same.

6. Indivisible Goods:

The commodity should not be indivisible. In the case of durable consumer goods it is not possible to calculate their utility because their use is spread over a period of time. Moreover, a consumer does not buy five scooters, six television sets or even three sewing machines for his personal consumption.

10. Rational Consumers:

The consumer should be an economic man, who acts rationally. If he is under the influence of an intoxicant, say wine or opium, the utility of the latter units will rise. But this exception is not wholly true. In the beginning the marginal utility of each unit rises but ultimately it starts falling and even becomes negative when a drunkard starts vomiting.

11. Ordinary Goods:

Goods should be of an ordinary type. If they are commodities, like diamonds and jewels, or hobby goods like stamps, coins or paintings, the law does not apply. The utility of the additional coins or jewels may be greater than the earlier pieces.

But this view is not correct. For the law also applies in their case. The collector of coins or jewels will never like to have innumerable pieces of the

same coin or jewels. Similarly, the marginal utility of the second set of a particular issue of stamps will diminish for the stamp collector if he already possesses one.

12. MU of Money not constant:

Our intensity for money increases as we have more of it. No doubt the marginal utility of money does not become zero, but it definitely falls as a person acquires more and more money. The marginal utility of money for a rich man is less while it is high for a poor man. If it were not so, the rich would not spend extravagantly on luxuries and ostentatious living.

The Law may not operate in certain circumstances and in those exceptional cases the marginal utility of a thing may increase for some time.

Six important exceptional cases to the law are:

1. Change of Taste and Preferences:

If a consumer's taste changes so that he likes a commodity more, the marginal utility of any quantity of that commodity rises. A person may not have initially any interest in eating egg roll. But after taking one egg roll, he may form a good taste for it and may get a great satisfaction from the 2nd or the 3rd one.

2. Inadequate Initial Consumption:

If a person consumes a very small quantity of a particular thing at the initial stage, he may not get full satisfaction from it. In such a case his satisfaction will be greater from the second unit. Thus, coke in a small glass may not quench one's thirst at all, as such, the satisfaction from the second one is likely to be greater.

3. Emotional or Fancy Buying:

The marginal utility of a thing does not diminish when a buyer purchases it in a larger quantity out of sheer emotion or fancy. An example is the art work of a known painter or a rare book of a dead author.

4. Miser's Collections or Hobby Collections:

A miser gets a greater satisfaction from the additional collection of money. Similarly, a person gets more and more satisfaction as his hobby-collections (e.g., stamps, coins, works of art, etc.) increase gradually.

5. Consumption at Different Time Periods:

If a person consumes different units of a particular thing at different times, the marginal utility from the successive units is not likely to be smaller. Thus, if he consumes the 1st ice-cream in the morning, the 2nd in the afternoon and the 3rd at night, the marginal utility may not diminish.

6. Stock with Other Persons:

Sometimes the utility of a thing depends on its stock with the others. If in a locality all but one has two cars, the second car to that man will not yield diminishing utility.

4. Diminishing Prices

The Law of Diminishing Marginal Utility directly relates to the concept of diminishing prices. As the utility of a product decreases as its consumption increases, consumers are willing to pay smaller dollar amounts for more of the product. For example, assume an individual pays ₹1000 for a vacuum cleaner. Because he has little value for a second vacuum cleaner, the same individual is willing to pay only ₹550 for a second vacuum cleaner. The law of diminishing marginal utility directly impacts a company's pricing because the price charged for an item must correspond to the consumer's marginal utility and willingness to consume or utilize the good.

5. Example of Diminishing Utility

An individual can purchase a slice of pizza for ₹50; she is quite hungry and decides to buy five slices of pizza. After doing so, the individual consumes the first slice of pizza and gains a certain positive utility from eating the food. Because the individual was hungry and this is the first food she consumed, the first slice of pizza has a high benefit. Upon consuming the second slice of pizza, the individual's appetite is becoming satisfied. She wasn't as hungry as before, so the second slice of pizza had a smaller benefit and enjoyment as the first. The third slice, as before, holds even less utility as the individual is now not hungry anymore.

In fact, the fourth slice of pizza has experienced a diminished marginal utility as well, as it is difficult to be consumed because the individual experiences discomfort upon being full from food. Finally, the fifth slice of pizza cannot even be consumed. The individual is so full from the first four slices that consuming the last slice of pizza results in negative utility. The five slices of pizza demonstrate the decreasing utility that is experienced upon the consumption of any good. In a business application, a company may benefit from having three accountants on its staff. However, if there is no need for another accountant, hiring a fourth accountant results in a diminished utility, as little benefit is gained from the new hire.

6. Importance Of the Law

This law is of great importance in economics:

7. Basis of Economic Laws:

The Law of Diminishing Marginal Utility is the basic law of consumption. The Law of Demand, the Law of Equi-marginal Utility, and the Concept of Consumer's Surplus are based on it.

8. Diversification in Consumption and Production:

The changes in design, pattern and packing of commodities very often brought about by producers are in keeping with this law. We know that the use of the same good makes us feel bored; its utility diminishes in our estimation. We want variety in soaps, toothpastes, pens, etc. Thus, this law helps in bringing variety in consumption and production.

9. Value Theory:

The law helps to explain the phenomenon in value theory that the price of a commodity falls when its supply increases. It is because with the increase in the stock of a commodity, its marginal utility diminishes.

10. Diamond-Water Paradox:

The famous "diamond-water paradox" of Smith can be explained with the help of this law. Because of their relative scarcity, diamonds possess high marginal utility and so a high price. Since water is relatively abundant, it possesses low marginal utility and hence low price even though its total utility is high. That is why water has a low price as compared to a diamond though it is more useful than the latter.

11. Progressive Taxation:

The principle of progression in taxation is also based on this law. As a person's income increases, the rate of tax rises because the marginal utility of money to him falls with the rise in his income.

12. Basis of Socialism:

His law underlies the socialist plea for an equitable distribution of wealth. The marginal utility of money to the rich is low. It is, therefore, advisable that their surplus wealth be acquired by the state and distributed to the poor who possess high marginal utility for money.

13. For Producer:

This law helps the producer in increasing sales. The producer reduces the price of the product for the purpose of increasing sales. The consumers purchase more quantity of that product to obtain maximum satisfaction given their income. As they

buy more quantities the marginal utility of the last rupee diminishes. Thus, the sale of the product increases.

7. Issues Of the Law

Three important issues may now be considered:

1. Can Marginal Utility Ever Become Zero?

In case of most commodities (except money and certain rare goods) consumption beyond a certain point gives no extra utility or satisfaction.

When we are asked if we would like more of a commodity and say 'yes', we know that there is a limit to our desire for it (at its present price in any given period). At some fixed point of time (say, a hour, or a day, or a week) we will want less of it than before and after sometime we would not want any more of it at all.

Economists often consider imaginary people in imaginary situations to illustrate this point. One classic example is of the person in the desert who has been deprived of water and who, when offered a glass of water, knows how great its utility is. The second glass also gives him much satisfaction and so does the third, but surely there will come a point when his thirst, even in a desert, will be sated. If he is forced to consume more water his satisfaction will fall.

This is why an individual would not voluntarily continue to consume water, or any other commodity such as food, cigarettes, liquor and recreation when MU becomes negative. In other words, a rational consumer would never so increase his consumption of a commodity as to cause its total utility to be maximum and marginal utility to be zero.

2. Universality of the Law of Diminishing Marginal Utility:

This Law is widely applicable. However, it is wrong to assume that the Law applies to every commodity for every-thing in the real world. There are various exceptions. For example, for those people who drink alcohol due to addiction, the seconds or third drink may give more satisfaction than the first one. But, sooner or later, the point of diminishing MU will be reached because every extra unit will give less and less satisfaction. In fact, if an individual drinks too much he is bound to fall sick.

3. Multiple Uses of Goods:

Some commodities are used for specific purposes, such as cooking gas. Others have multiple uses, such as milk. The demand for the latter is called composite demand. In fact, the Law of DMU is related to the number of uses to which a commodity can be put.

This no doubt varies from one commodity to another. For example, let us consider milk. It is consumed by the babies in almost every family. It is used to feed the dogs in some families. It is also used by sweet shops to prepare sweetmeats and by restaurants to make tea.

All these uses of milk have the same value to the person buying it. But some uses have more value than others. R. G. Lipsey has pointed out that the diminishing values of uses helps to explain why the demand for a commodity like milk (and virtually all other commodity) slopes downward. When the price of milk is Rs. 15 per kg it will be purchased mainly for feeding the children.

When the price is a little lower, it may be used to make some sweets for obliging the other members of the family or by offering sweets to neighbours and relatives on a special occasion such as Diwali. When price falls further a cup of tea may be made entirely with milk. However, shop-owners will make more sweets with milk and less with other ingredients.

A certain portion may be 'wasted' by pouring it on the statue of the Great God— Shiva. The basic point is clear: the large number and variety of uses to which milk can be put in-forces the tendency for MU to fall with an increase in the consumption of a commodity. The reason is simple: as the price of milk falls, it may be used for less valued purposes. At the same time it will be used in large quantities for more valued purposes.

Let us take the example of water to give a clear idea. A minimum quantity of water is essential to maintain our existence. So we are ready to give our entire income to obtain that quantity. So the marginal utility of the minimum quantity is very high. One can drink much more than this quantity. But the MU of more and more glasses of water drunk during a specific time period will gradually fall. So the demand curve for water — like that of any other commodity — is downward sloping from left to right.

However, in a broad sense, water has multiple uses. It is used for various purposes other than drinking — such as to take baths, for washing clothes and cars, watering the flower garden and the lawn, brushing one's teeth and so on. To any of us, the importance of all these uses will vary. But at any fixed point of time some of the uses are more important than others. So it is quite reasonable to expect that as the price of water-falls it is put to more and more 'lower utility uses'.

8. Application Of the Law

We have seen how the law of diminishing marginal utility helps in understanding the tendency of marginal utility to fall with increase in intake or consumption of a commodity by a consumer. Apart from that we have also gone through the assumptions, exceptions as well as limitation of this law. Do you think such an important law could be understood without getting a sense of how it is applicable? Isn't it better to understand the importance of this important economic law? That is what we are going to see in this write-up. The law of diminishing marginal utility has both theoretical as well as practical applications. Let us see what they are.

1. Serves as foundation for other economic laws:

We have mentioned earlier that the law of demand could be understood on the basis of the law of DMU. The derivation of the law of demand has its base in the law of diminishing marginal utility as the inverse relation between the quantity demanded and price can be brought out through this law. It thus helps us in getting a sense as to why the demand curve has downward sloping nature. Similarly this law is useful understanding other concepts like the consumer behavior as well as equilibrium when we are talking about a single want at time.

2. Helps in business:

Pricing of the products is one of the most important business decisions. We understand that marginal utility of a product diminishes with the increase in consumption or increase in the stock. This helps the producers in framing the prices because when consumers need to attain the equilibrium then they may purchase more of the commodity to reduce the marginal utility. The manufacturers thus could reduce the price in order to encourage sales. It simply means that the consumers may try to connect the marginal utility and price of the commodity and this is the reason why more quantities are bought at reduced prices.

3. Scheduling purchases:

The law of DMU helps in scheduling purchases. Through the law of diminishing returns a person may understand how to schedule the purchases since this law gives an understanding as to when the point of satiety or maximum satisfaction can be attained. This simply means that this law enables a person to know by consumption of how much units greatest satisfaction is attained and through this purchases can be planned accordingly. This also helps in utilizing the incomes efficiently.

4. Public Finance:

The law of DMU is helpful in this area too. The taxation policy may be devised in such a way that it is progressive in nature meaning the higher taxes for the rich. This way the government may be able to raise more funds since usually with rise in incomes the marginal utility of money may witness a fall. A tax policy which taxes the affluent more and the people falling in the lower income group less may thus be beneficial in the area of public finance. Income inequalities could be dealt with by taxing the goods which are enjoyed by the affluent people more. Government may devise the fiscal policies with the help of the law of diminishing marginal utility. So how can this be done? Well, as we understand the value of money may be different for different people. Here we are talking in terms of additional money, as for an affluent individual the value of additional money is trivial but this is not the case for an underprivileged person. On the basis of the value of money fiscal policy may be formulated.

5. Welfare measures could be understood:

Welfare measures are meant to create welfare policies for the deprived people. As we have seen in the point of public finance the funds that are generated by taxing the affluent people at higher level could be utilized for the welfare of the people in the form of free education and health facilities for the underprivileged as well as food subsidies for them.

6. Paradox of value could be understood

A commodity may be understood with respect to value-in-use and value-in-exchange. Let us try to get a sense of both these terms. The usefulness of the product is termed as value in use. What is value in exchange then? It is the value rate of one product with respect to other. These both terms are explained by paradox of value. Paradox of value helps in understanding the variation between these two terms. These are usually explained with the help of commodities like water and salt with respect to those like diamonds. We certainly cannot doubt the utility of water and hence its value in use is very high. It means that the total utility of water is higher. But what about the value in exchange for water? The value in exchange is not that high or we could also say that it is trivial. This is due to the marginal utility, as marginal utility of water is very less and also it reduces extremely quickly. Now let us see the situation of diamonds. For a commodity like diamond the marginal utility is too high and it also reduces slowly but total utility is not as high as that of water. So this means for diamonds value in exchange is very high and the value in use is quite low. So here we have seen how marginal utility of a product determines the value in exchange. Another factor in this situation is the availability of the products. Diamonds we know is a scarce commodity and this is not the case with water. Marginal utility indicates the appeal or the intensity of the want. For diamond the marginal utility is very high showing the high degree of intensity of the want

as the availability is scarce and hence even at higher price these are bought by the people. But for water, it is available in larger quantities which makes marginal utility quite low and hence is also priced low.

9. Conclusion

So two major points that emerge from our discussion so far are:

- (a) The demand curve for a commodity slopes downward because successive units consumed of it in any one use give less and less satisfaction (i.e., have diminishing MU)
- (b) The demand curve is downward sloping for another reason—most commodities have multiple uses that confer different utilities.
- (c) So we have seen how the law of diminishing marginal utility is useful in both theoretical as well as practical areas. This law of DMU as mentioned helps in understanding the concepts like consumer equilibrium, elasticity of demand and also the law of equi-marginal utility.